NPTEL : Nonlinear Dynamical Systems (Electrical Engineering)

Co-ordinators : Prof. Harish K. Pillai, Prof. Madhu N. Belur

NPTEL : Power System Dynamics and Control (Electrical Engineering)

Co-ordinators : Dr. A.M. Kulkarni

NPTEL : Control Engineering (Prof. S.D. Agashe) (Electrical Engineering)

Co-ordinators : Prof. S.D. Agashe

NPTEL : Power Electronics (Electrical Engineering)

Co-ordinators : Prof. Kishore Chatterjee, Prof. B.G. Fernandes

NPTEL : Fabrication of Silicon VLSI Circuits using the MOS technology (Electrical Engineering)

Co-ordinators : Prof. A.N. Chandorkar

NPTEL : NOC:Computational Electromagnetics and Applications (Electrical Engineering)

Co-ordinators : Prof.Krish Sankaran

NPTEL : NOC:Basic Electronics (Electrical Engineering)

Co-ordinators : Prof. Mahesh B. Patil

NPTEL : NOC:Antennas (Electrical Engineering)

Co-ordinators : Prof. Girish Kumar

NPTEL : NOC:Fundamentals of Wavelets, Filter Banks and Time Frequency Analysis (Electrical Engineering)

Co-ordinators : Prof. V.M. Gadre

NPTEL : NOC:Analog Circuits (2017) (Electrical Engineering)

Co-ordinators : Prof. Jayanta Mukherjee

NPTEL : NOC:Microwave Theory and Techniques (Electrical Engineering)

Co-ordinators : Prof. Girish Kumar

NPTEL : NOC:Principles of Digital Communications (Electrical Engineering)

Co-ordinators : Prof. S.N. Merchant

Lecture 65 - Channel Coding: Decoding using Standard Arrays

NPTEL : NOC:Fundamental of Power Electronics (Electrical Engineering)

Co-ordinators : Prof. Vivek Agarwal

Lecture 98 - Simulation of sinusoidal PWM

NPTEL : NOC:Electrical Equipment and Machines: Finite Element Analysis (Electrical Engineering)

Co-ordinators : Prof. Shrikrishna V. Kulkarni

NPTEL : NOC:Digital Signal Processing and its Applications (Electrical Engineering)

Co-ordinators : Prof. V. M. Gadre

Lecture 32 - Dual to convolution property

Lecture 33 - Multiplication Property, Introduction to Parsevalâ€™s theorem

Lecture 34 - Introduction and Property of DTFT

Lecture 35 - Review of Inverse DTFT

Lecture 36 - Parsevalâ€™s Theorem and energy and time spectral density

Lecture 37 - Discussion on Unit Step

Lecture 38 - Introduction to Z transform

Lecture 39 - Example of Z transform

Lecture 40 - Region of Convergence

Lecture 41 - Properties of Z transform

Lecture 42 - Z- Transform

Lecture 43 - Rational System

Lecture 44 - Introduction and Examples of Rational Z Transform and their Inverses

Lecture 45 - Double Pole Examples and their Inverse Z Transform

Lecture 46 - Partial Fraction Decomposition

Lecture 47 - LSI System Examples

Lecture 48 - Why are Rational Systems so important?

Lecture 49 - Solving Linear constant coefficient difference equations which are valid over a finite range of time

Lecture 50 - Introduction to Resonance in Rational Systems

Lecture 51 - Characterization of Rational LSI system

Lecture 52 - Causality and stability of the ROC of the system function

Lecture 53 - Recap of Rational Systems and Discrete Time Filters

Lecture 54 - Specifications for Filter Design

Lecture 55 - Four Ideal Piecewise Constant Filters

Lecture 56 - Important Characteristics Of Ideal Filters

Lecture 57 - Synthesis of Discrete Time Filters, Realizable specifications

Lecture 58 - Realistic Specifications for low pass filter. Filter Design Process

Lecture 59 - Introduction to Filter Design. Analog IIR Filter,FIR discrete-time filter, IIR discrete-time filter

Lecture 60 - Analog to discrete transform

Lecture 61 - Intuitive transforms, Bilinear Transformation

Lecture 62 - Steps for IIR filter design

Lecture 63 - Analog filter design using Butterworth Approximation

Lecture 64 - Butterworth filter Derivation And Analysis of butterworth system function

NPTEL : NOC:Stochastic Control and Communication (Electrical Engineering)

Co-ordinators : Prof. Ankur A. Kulkarni

Lecture 65 - Communication Theory - V

NPTEL : Circuit Theory (Electrical Engineering)

Co-ordinators : Prof. S.C. Dutta Roy

NPTEL : Control Engineering (Prof. M. Gopal) (Electrical Engineering)

Co-ordinators : Prof. M. Gopal

NPTEL : Embedded Systems (Electrical Engineering)

Co-ordinators : Prof. Santanu Chaudhary

NPTEL : Power System Generation, Transmission and Distribution (Encapsulated from earlier Video) (Electrical Engineering)

Co-ordinators : Prof. D.P. Kothari

NPTEL : Power System Dynamics (Electrical Engineering)

Co-ordinators : Dr. M.L. Kothari

NPTEL : Analog Electronic Circuits (Electrical Engineering)

Co-ordinators : Prof. S.C. Dutta Roy

NPTEL : Digital Communication (Electrical Engineering)

Co-ordinators : Prof. Surendra Prasad

NPTEL : Introduction To Electronic Circuits (Electrical Engineering)

Co-ordinators : Prof. S.C. Dutta Roy

NPTEL : NOC:Analog Electronic Circuit (Electrical Engineering)

Co-ordinators : Dr. Shouribrata Chatterjee

NPTEL : NOC:Nonlinear and Adaptive Control (Electrical Engineering)

Co-ordinators : Prof. Shubhendu Bhasin

NPTEL : NOC:Information Theory, Coding and Cryptography (Electrical Engineering)

Co-ordinators : Prof. Ranjan Bose

NPTEL : Engineering Electromagnetics (Electrical Engineering)

Co-ordinators : Prof. Sheel Aditya

NPTEL : NOC:Principles of Digital Communications (2018) (Electrical Engineering)

Co-ordinators : Prof. Abhishek Dixit

NPTEL : NOC:Electric Vehicles - Part 1 (Electrical Engineering)

Co-ordinators : Prof. Amit Jain

NPTEL : NOC:Power Electronics (Electrical Engineering)

Co-ordinators : Prof. G.Bhuvaneshwari

NPTEL : NOC:Electrical Machines (Electrical Engineering)

Co-ordinators : Prof. G.Bhuvaneshwari

NPTEL : Special Electromechanical Systems (Electrical Engineering)

Co-ordinators : Prof. S.S. Murthy

NPTEL : NOC:High Power Multilevel Converters - Analysis, Design and Operational Issues (Electrical Engineering)

Co-ordinators : Prof. Anand Rup

NPTEL : NOC:Introduction to Embedded System Design (Electrical Engineering)

Co-ordinators : Prof. Badri N Subudhi, Prof.Dhananjay V. Gadre

NPTEL : NOC:Power Quality (Electrical Engineering)

Co-ordinators : Prof. Bhim Singh

NPTEL : NOC:Introduction to Electrical Engineering (Electrical Engineering)

Co-ordinators : Prof. Bhim Singh

NPTEL : NOC:Transducers for Instrumentation (Electrical Engineering)

Co-ordinators : Ankur Gupta

NPTEL : Advanced Control Systems (Electrical Engineering)

Co-ordinators : Prof. S. Majhi

NPTEL : NOC:Optimization Techniques for Digital VLSI Design (Electrical Engineering)

Co-ordinators : Dr. Santosh Biswas, Prof. Chandan Karfa

NPTEL : NOC:Advanced Topics in Probability and Random Processes (Electrical Engineering)

Co-ordinators : Prof. Prabin K Bora

NPTEL : NOC:Microwave Engineering (Electrical Engineering)

Co-ordinators : Dr. Ratnajit Bhattacharjee

NPTEL : NOC:Microprocessors and Interfacing (Electrical Engineering)

Co-ordinators : Prof. Shaik Rafi Ahamed

NPTEL : NOC:Statistical Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Prabin Kumar Bora

NPTEL : NOC:Computer Vision and Image Processing - Fundamentals and Applications (Electrical Engineering)

Co-ordinators : Prof. M. K. Bhuyan

NPTEL : NOC:System Design through VERILOG (Electrical Engineering)

Co-ordinators : Prof. Shaik Rafi Ahamed

NPTEL : NOC:Usability Engineering (Electrical Engineering)

Co-ordinators : Prof. Debayan Dhar

NPTEL : NOC:Probability and Random Processes (Electrical Engineering)

Co-ordinators : Prof. Ribhu, Prof. Rohit Sinha

NPTEL : NOC:Simulation of Communication Systems using Matlab (Electrical Engineering)

Co-ordinators : Dr. Ribhu

Lecture 32 - Signals and Noise

Lecture 33 - Stochastic Models

Lecture 34 - The AR-1 Process

Lecture 35 - Stochastic Models II

Lecture 36 - Yule Walker Equations

Lecture 37 - Markov Chains - I

Lecture 38 - Markov Chains - II

Lecture 39 - Markov Chains - III

Lecture 40 - Analog to Digital Coversion

Lecture 41 - K Means

Lecture 42 - Correlation

Lecture 43 - Predictive Coding

Lecture 44 - Image Compression

Lecture 45 - Transform Domain Compression

Lecture 46 - Multi Resolution Coding

Lecture 47 - Introduction to Communications

Lecture 48 - Low Pass and BandPass Signals

Lecture 49 - Signal Spaces

Lecture 50 - PAM

Lecture 51 - Detection

Lecture 52 - Effects of AWGN

Lecture 53 - ML Detection - I

Lecture 54 - ML Detection - II

Lecture 55 - The Union Bound

Lecture 56 - Symbol Error Rates

Lecture 57 - Choosing Constellations

Lecture 58 - Orthogonal Signalling

Lecture 59 - Non-Coherent Dection - 1

Lecture 60 - Non-Coherent Dection - 2

Lecture 61 - DPSK - I

Lecture 62 - DPSK - II

Lecture 63 - Introduction to Wireless Communications

Lecture 64 - Conclusion

NPTEL : NOC:Machine Learning and Deep Learning - Fundamentals and Applications (Electrical Engineering)

Co-ordinators : Prof. M.K. Bhuyan

NPTEL : Advanced Electric Drives (Electrical Engineering)

Co-ordinators : Dr. S.P. Das

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

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Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

NPTEL : High Voltage DC Transmission (Electrical Engineering)

Co-ordinators : Dr. S.N. Singh

NPTEL : Intelligent Systems and Control (Electrical Engineering)

Co-ordinators : Prof. Laxmidhar Behera

Lecture 1 - Introduction to Intelligent Systems and Control

Lecture 2 - Linear Neural networks

Lecture 3 - Multi layered Neural Networks

Lecture 4 - Back Propagation Algorithm revisited

Lecture 5 - Non Linear System Analysis - Part I

Lecture 6 - Non Linear System Analysis - Part II

Lecture 7 - Radial Basis Function Networks

Lecture 8 - Adaptive Learning rate

Lecture 9 - Weight update rules

Lecture 10 - Recurrent networks Back propagation through time

Lecture 11 - Recurrent networks Real time recurrent learning

Lecture 12 - Self organizing Map - Multidimensional networks

Lecture 13 - Fuzzy sets - A Primer

Lecture 14 - Fuzzy Relations

Lecture 15 - Fuzzy Rule base and Approximate Reasoning

Lecture 16 - Introduction to Fuzzy Logic Control

Lecture 17 - Neural Control A review

Lecture 18 - Network inversion and Control

Lecture 19 - Neural Model of a Robot manipulator

Lecture 20 - Indirect Adaptive Control of a Robot manipulator

Lecture 21 - Adaptive neural control for Affine Systems SISO

Lecture 22 - Adaptive neural control for Affine systems MIMO

Lecture 23 - Visual Motor Coordination with KSOM

Lecture 24 - Visual Motor coordination - quantum clustering

Lecture 25 - Direct Adaptive control of Manipulators - Intro

Lecture 26 - NN based back stepping control

Lecture 27 - Fuzzy Control - a Review

Lecture 28 - Mamdani type flc and parameter optimization

Lecture 29 - Fuzzy Control of a pH reactor

Lecture 30 - Fuzzy Lyapunov controller - Computing with words

Lecture 31 - Controller Design for a T-S Fuzzy model

Lecture 32 - Linear controllers using T-S fuzzy model

NPTEL : Power Systems Operation and Control (Electrical Engineering)

Co-ordinators : Dr. S.N. Singh

NPTEL : NOC:Electromagnetic theory (Electrical Engineering)

Co-ordinators : Dr. Pradeep Kumar K

NPTEL : NOC:Principles of Communication - Part 1 (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

NPTEL : NOC:An Introduction to Coding Theory (Electrical Engineering)

Co-ordinators : Dr. Adrish Banerjee

NPTEL : NOC:Principles of Communication Systems - Part II (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

NPTEL : NOC:Applied Engineering Electromagnetics (Electrical Engineering)

Co-ordinators : Dr. Pradeep Kumar K

NPTEL : NOC:Principles of Signals and Systems (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 31 - Z-Transform Examples - IV

Lecture 32 - Inverse Z-Transform

Lecture 33 - Fourier Analysis Introduction

Lecture 34 - Complex Exponential and Trigonometric FS

Lecture 35 - Conditions for Existence of FS

Lecture 36 - Fourier Transform (FT) Introduction

Lecture 37 - Properties of Fourier Transform - I

Lecture 38 - Properties of Fourier Transform - II

Lecture 39 - Fourier Transform - Parsevalâ€™s Relation

Lecture 40 - Fourier Transform of LTI Systems

Lecture 41 - FT- Ideal and Non-Ideal Filters

Lecture 42 - Fourier Analysis Examples - I

Lecture 43 - Fourier Analysis Examples - II

Lecture 44 - Fourier Analysis Examples - III

Lecture 45 - Fourier Analysis Examples - IV

Lecture 46 - Fourier Analysis Examples - V

Lecture 47 - Fourier Analysis Examples - VI

Lecture 48 - Fourier Analysis Bode Plot - I

Lecture 49 - Fourier Analysis Bode Plot - II

Lecture 50 - Fourier Transform Examples: Filtering - Ideal Low Pass Filter

Lecture 51 - Fourier Transform Problems: Unit Step Response of RC Circuit, Sampling of Continuous Signal

Lecture 52 - Sampling: Spectrum of Sampled Signal, Nyquist Criterion

Lecture 53 - Sampling: Reconstruction from Sampled Signal

Lecture 54 - Fourier Analysis of Discrete Time Signals and Systems - Introduction

Lecture 55 - Fourier Analysis of Discrete Time Signals - Duality, Parsevalâ€™s Theorem

Lecture 56 - Discrete Time Fourier Transform: Definition, Inverse DTFT, Convergence, Relation between DTFT and z-Transform, DTFT of Common Signals

Lecture 57 - Discrete Time Fourier Transform: Properties of DTFT - Linearity, Time Shifting, Frequency Shifting, Conjugation, Time-Reversal, Duality

Lecture 58 - Discrete Time Fourier Transform: Properties of DTFT - Differentiation in Frequency, Difference in Time, Convolution, Multiplication, Parsevalâ€™s Relation

Lecture 59 - DTFT: Discrete Time LTI Systems - LTI Systems Characterized by Difference Equations

Lecture 60 - Discrete Fourier Transform - Definition, Inverse DFT, Relation between DFT and DFS, Relation between DFT and DTFT, Properties - Linearity, Time Shifting

Lecture 61 - Discrete Fourier Transform: Properties - Conjugation, Frequency Shift, Duality, Circular Convolution, Multiplication, Parsevalâ€™s Relation, Example Problems for Fourier Analysis of Discrete Time Signals

NPTEL : NOC:Applied Optimization for Wireless, Machine Learning, Big Data (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 32 - Examples on Test for Convexity, Quasi-Convexity

Lecture 33 - Examples on Convex Functions

Lecture 34 - Practical Application: Beamforming in Multi-antenna Wireless Communication

Lecture 35 - Practical Application: Maximal Ratio Combiner for Wireless Systems

Lecture 36 - Practical Application: Multi-antenna Beamforming with Interfering User

Lecture 37 - Practical Application: Zero-Forcing (ZF) Beamforming with Interfering User

Lecture 38 - Practical Application: Robust Beamforming With Channel Uncertainity for Wireless Systems

Lecture 39 - Practical Application: Robust Beamformer Design for Wireless Systems

Lecture 40 - Practical Application: Detailed Solution for Robust Beamformer Computation in Wireless Systems Text

Lecture 41 - Linear modeling and Approximation Problems: Least Squares

Lecture 42 - Geometric Intuition for Least Squares

Lecture 43 - Practical Application: Multi antenna channel estimation

Lecture 44 - Practical Application:Image deblurring

Lecture 45 - Least Norm Signal Estimation

Lecture 46 - Regularization: Least Squares + Least Norm

Lecture 47 - Convex Optimization Problem representation: Canonical form, Epigraph form

Lecture 48 - Linear Program Practical Application: Base Station Co-operation

Lecture 49 - Stochastic Linear Program,Gaussian Uncertainty

Lecture 50 - Practical Application: Multiple Input Multiple Output (MIMO) Beamforming

Lecture 51 - Practical Application: Multiple Input Multiple Output (MIMO) Beamformer Design

Lecture 52 - Practical Application: Co-operative Communication, Overview and various Protocols used

Lecture 53 - Practical Application: Probability of Error Computation for Co-operative Communication

Lecture 54 - Practical Application:Optimal power allocation factor determination for Co-operative Communication

Lecture 55 - Practical Application: Compressive Sensing

Lecture 56 - Practical Application

Lecture 57 - Practical Application- Orthogonal Matching Pursuit (OMP) algorithm for Compressive Sensing

Lecture 58 - Example Problem: Orthogonal Matching Pursuit (OMP) algorithm

Lecture 59 - Practical Application : L1 norm minimization and regularization approach for Compressive Sensing Optimization problem

Lecture 60 - Practical Application of Machine Learning and Artificial Intelligence:Linear Classification, Overview and Motivation

Lecture 61 - Practical Application: Linear Classifier (Support Vector Machine) Design

Lecture 62 - Practical Application: Approximate Classifier Design

Lecture 63 - Concept of Duality

Lecture 64 - Relation between optimal value of Primal and Dual Problems, concepts of Duality gap and Strong Duality

NPTEL : NOC:Fiber-Optic Communication Systems and Techniques (Electrical Engineering)

Co-ordinators : Dr. Pradeep Kumar K

Lecture 32 - Basics of Lasers-I (Structure of Lasers, Process of Photon Emission)

Lecture 33 - Basics of Lasers-II (Einstein's Theory of Radiation)

Lecture 34 - Basics of Lasers-III (Population Inversion and Rate Equation for Lasers)

Lecture 35 - Basic Properties of Semiconductor Laser-I (Energy Gap, Intrinsic and Extrinsic Semiconductors)

Lecture 36 - Basic Properties of Semiconductor Laser-II (Fermi Level)

Lecture 37 - Optical Properties of Semiconductors-I (Direct Bandgap and Indirect Bandgap, Density of States)

Lecture 38 - Optical Properties of Semiconductors-II (Gain, Absorption, Recombination rate) Homojunction Lasers

Lecture 39 - Double Heterostructure Lasers, Introduction to Quantum Well Lasers

Lecture 40 - Semiconductor Optical Amplifier

Lecture 41 - Erbium-doped fiber amplifier

Lecture 42 - Photodetectors

Lecture 43 - Noise in Photodetectors

Lecture 44 - Introduction to WDM components

Lecture 45 - Couplers, Circulators, FRM and Filters

Lecture 46 - Filter, MUX/DEMUX, Diffraction grating (FBG and Long period grating)

Lecture 47 - Optical Modulators-I (Current modulation)

Lecture 48 - Optical Modulators-II (Electro-optic modulators)

Lecture 49 - Review of Communication Concepts-I (Deterministic and Random Signals, Baseband and Passband Signals)

Lecture 50 - Review of Communication Concepts-II (Signal and vectors, Signal energy, Orthonormal basis functions)

Lecture 51 - Intensity modulation/ Direct Detection

Lecture 52 - BER discussion for OOK systems

Lecture 53 - Higher order modulation and Coherent Receiver

Lecture 54 - Coherent receiver for BPSK systems and BER calculation

Lecture 55 - Recovering Polarization

Lecture 56 - DSP algorithms for Chromatic dispersion mitigation

Lecture 57 - DSP algorithms for Carrier phase estimation - I

Lecture 58 - DSP algorithms for Carrier phase estimation - II

Lecture 59 - Nonlinear effects in fiber

Lecture 60 - Four wave mixing, Loss measurement, Dispersion measurement

Lecture 61 - Lab Demonstration (Laser diode characteristics, Loss measurement, Optical Intensity Modulation)

NPTEL : NOC:Electromagnetic Waves in Guided and Wireless Media (Electrical Engineering)

Co-ordinators : Dr. Pradeep Kumar K

NPTEL : NOC:Basic Electric Circuits (Electrical Engineering)

Co-ordinators : Prof. Ankush Sharma

NPTEL : NOC:Fundamentals of Electric Drives (Electrical Engineering)

Co-ordinators : Prof. Shyama Prasad Das

Lecture 29 - Closed-loop operation of slip ring induction motor with static rotor resistance control, Slip power recovery in slip ring induction motor - Static Kramer drive

Lecture 30 - Static Kramer drive and its closed-loop control, Introduction to synchronous motor

Lecture 31 - Various types of synchronous motors, Equivalent circuit and phasor diagram of cylindrical synchronous motor, Speed-torque characteristics of cylindrical synchronous motor

Lecture 32 - Phasor diagram of salient pole synchronous motor, Expression of power and torque for a salient pole synchronous motor, Synchronous reluctance motor, Open-loop V/f control of synchronous motor

Lecture 33 - Open-loop V/f control, Torque-speed characteristics, Self controlled synchronous motor drive employing load commutated thyristor inverter

Lecture 34 - Detailed analysis of commutation of load commutated thyrisor inverter, Derivation of overlap angle and margin angle, Closed-loop speed control scheme for load commutated inverter-fed synchronous motor drive

Lecture 35 - Low cost brushless DC motor (BLDCM), Trapezoidal permanent magnet AC motor

Lecture 36 - Trapezoidal permanent magnet AC motor, Derivation of power and torque, Closed-loop control of trapezoidal BLDC motor, Introduction to switched reluctance motor

Lecture 37 - Construction and operating principle of switched reluctance motor

Lecture 38 - Current/ voltage control for switched reluctance motor, operating modes of switched reluctance motor, Introduction to traction drives

Lecture 39 - Current collector for mainline trains, Nature of traction load, Duty cycle of traction drives

Lecture 40 - Duty cycle of traction drives, Distance between two stops, Calculation of total tractive effort and drive rating

NPTEL : NOC:Fuzzy Sets, Logic and Systems and Applications (Electrical Engineering)

Co-ordinators : Prof. Nishchal K Verma

NPTEL : NOC:Peer to Peer Networks (Electrical Engineering)

Co-ordinators : Prof. Yatindra N Singh

NPTEL : NOC:Applied Linear Algebra for Signal Processing, Data Analytics and Machine Learning (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

NPTEL : NOC:Economic Operations and Control of Power Systems (Electrical Engineering)

Co-ordinators : Prof. Gururaj Mirle Vishwanath, Prof. Narayana Prasad Padhy

NPTEL : NOC:Digital Switching (Electrical Engineering)

Co-ordinators : Prof. Yatindra N Singh

NPTEL : NOC:Analog VLSI Design (Electrical Engineering)

Co-ordinators : Prof. Imon Mondal

Lecture 65

NPTEL : Electrical Machines I (Electrical Engineering)

Co-ordinators : Dr. D. Kastha

NPTEL : Optimal Control (Electrical Engineering)

Co-ordinators : Prof. G.D. Ray

NPTEL : Chaos, Fractals and Dynamic Systems (Electrical Engineering)

Co-ordinators : Prof. S. Banerjee

NPTEL : Digital Signal Processing (Electrical Engineering)

Co-ordinators : Prof. T.K. Basu

NPTEL : Dynamics of Physical Systems (Electrical Engineering)

Co-ordinators : Prof. S. Banerjee

NPTEL : Energy Resources and Technology (Electrical Engineering)

Co-ordinators : Prof. S. Banerjee

NPTEL : Estimation of Signals and Systems (Electrical Engineering)

Co-ordinators : Prof. S. Mukhopadhyay

NPTEL : Illumination Engineering (Electrical Engineering)

Co-ordinators : Prof. N.K. Kishore

NPTEL : Industrial Automation and Control (Electrical Engineering)

Co-ordinators : Prof. S. Sen, Prof. S. Mukhopadhyay

NPTEL : Industrial Instrumentation (Electrical Engineering)

Co-ordinators : Prof. Alok Barua

Lecture 32 - Dissolved Oxygen Sensors - II

Lecture 33 - Flapper - Nozzle

Lecture 34 - Smart Sensors

Lecture 35 - Chromatography - I

Lecture 36 - Chromatography - II

Lecture 37 - Pollution Measurement

Lecture 38 - Control Valve - I

Lecture 39 - Control Valve - II

Lecture 40 - Signal Conditioning Integrated Circuits

NPTEL : Networks Signals and Systems (Electrical Engineering)

Co-ordinators : Prof. T.K. Basu

NPTEL : Power System Analysis (Electrical Engineering)

Co-ordinators : Prof. A.K. Sinha

NPTEL : NOC:Industrial Automation and Control (Electrical Engineering)

Co-ordinators : Prof. S. Mukhopadhyay

NPTEL : NOC:Medical Image Analysis (Electrical Engineering)

Co-ordinators : Prof. Debdoot Sheet

NPTEL : NOC:Biomedical Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Sudipta Mukhopadhyay

NPTEL : NOC:Microprocessors and Microcontrollers (Electrical Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

NPTEL : NOC:Deep Learning For Visual Computing (Electrical Engineering)

Co-ordinators : Prof. Debdoot Sheet

NPTEL : NOC:Power System Engineering (Electrical Engineering)

Co-ordinators : Prof. Debapriya Das

NPTEL : NOC:Fundamentals of Electrical Engineering (Electrical Engineering)

Co-ordinators : Prof. Debapriya Das

NPTEL : NOC:Digital Circuits (Electrical Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

Lecture 65 - 8086 Microprocessor (Continued...)

NPTEL : NOC:Analysis and Design Principles of Microwave Antennas (Electrical Engineering)

Co-ordinators : Dr. Amitabha Bhattacharya

NPTEL : NOC:Architectural Design of Digital Integrated Circuits (Electrical Engineering)

Co-ordinators : Prof. Indranil Hatai

NPTEL : NOC:Electrical Machines-II (Electrical Engineering)

Co-ordinators : Prof.Tapas Kumar Bhattacharya

NPTEL : NOC:Digital Electronic Circuits (Electrical Engineering)

Co-ordinators : Prof. Goutam Saha

NPTEL : NOC:Power System Dynamics, Control and Monitoring (Electrical Engineering)

Co-ordinators : Prof. Debapriya Das

NPTEL : NOC:Evolution of Air Interface towards 5G (Electrical Engineering)

Co-ordinators : Prof. Suvra Sekhar Das

NPTEL : NOC:Electrical Measurement and Electronic Instruments (Electrical Engineering)

Co-ordinators : Prof. Avishek Chatterjee

Lecture 65 - Dual slope digital voltmeter - II

Lecture 66 - Dual slope digital voltmeter and Integrator circuit

Lecture 67 - Digital ramp type voltmeter

Lecture 68 - Digital ramp type voltmeter and Successive approximation type voltmeter

Lecture 69 - ADC and DAC - I

Lecture 70 - ADC and DAC - II

Lecture 71 - Why we need electronic Instruments

Lecture 72 - Instruments with op-amp based amplifiers - I

Lecture 73 - Instruments with op-amp based amplifiers - II

Lecture 74 - Instruments with op-amp based amplifiers - III

Lecture 75 - Instrumentation Amplifier

Lecture 76 - Function generator

Lecture 77 - 555-Timer circuit

Lecture 78 - Astable and monostable oscillator circuits

Lecture 79 - Pulse generator

Lecture 80 - Oscilloscope - I

Lecture 81 - Oscilloscope - II

Lecture 82 - Emitter follower voltmeter

Lecture 83 - Linear ohmmeter

Lecture 84 - Ramp generator

NPTEL : NOC:Principles and Techniques of Modern Radar Systems (Electrical Engineering)

Co-ordinators : Dr. Amitabha Bhattacharya

NPTEL : NOC:Electrical Machines-I (Electrical Engineering)

Co-ordinators : Prof.Tapas Kumar Bhattacharya

NPTEL : NOC:VLSI Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Mrityunjay Chakraborty

NPTEL : NOC:Analog Electronic Circuits (Electrical Engineering)

Co-ordinators : Prof. Pradip Mandal

NPTEL : NOC:Network Analysis (Electrical Engineering)

Co-ordinators : Prof. T.K. Bhattacharya

NPTEL : NOC:Power System Protection (Electrical Engineering)

Co-ordinators : Prof. Ashok Kumar Pradhan

NPTEL : NOC:Signal Processing for mm Wave communication for 5G and beyond (Electrical Engineering)

Co-ordinators : Prof. Amit Kumar Dutta

NPTEL : NOC:Control and Tuning Methods in Switched Mode Power Converters (Electrical Engineering)

Co-ordinators : Prof. Santanu Kapat

NPTEL : NOC:Advanced Microwave Guided-Structures and Analysis (Electrical Engineering)

Co-ordinators : Prof. Bratin Ghosh

NPTEL : NOC:Cognition and its Computation (Electrical Engineering)

Co-ordinators : Prof. Rajlakshmi Guha, Prof. Sharba Bandyopadhyay

NPTEL : NOC:Digital Control in Switched Mode Power Converters and FPGA-based Prototyping (Electrical Engineering)

Co-ordinators : Prof. Santanu Kapat

NPTEL : NOC:VLSI Interconnects (Electrical Engineering)

Co-ordinators : Prof. Sarang Pendharker

NPTEL : NOC:Semiconductor Device Modeling and Simulation (Electrical Engineering)

Co-ordinators : Prof. Vivek Dixit

NPTEL : NOC:RF and Microwave Networks (Electrical Engineering)

Co-ordinators : Prof. Bratin Ghosh

NPTEL : NOC:Introduction to Adaptive Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Mrityunjoy Chakraborty

NPTEL : NOC:Nanobiophotonics: Touching Our Daily Life (Electrical Engineering)

Co-ordinators : Dr. Basudev Lahiri

NPTEL : Modelling and Analysis of Electric Machines (Electrical Engineering)

Co-ordinators : Dr. Krishna Vasudevan

Lecture 32 - Modelling of Salient Pole Synchronous Machines - II

Lecture 33 - Modelling of Salient Pole Synchronous Machines - III

Lecture 34 - Steady State Models - Induction Machine

Lecture 35 - Steady State Models - Salient Pole Synchronous Machine

Lecture 36 - Solution of Dynamic Equations of Induction Machine - I

Lecture 37 - Solution of Dynamic Equations of Induction Machine - II

Lecture 38 - Reactances of Salient Pole Synchronous Machines - I

Lecture 39 - Reactances of Salient Pole Synchronous Machines - II

Lecture 40 - Reactances of Salient Pole Synchronous Machines - III

Lecture 41 - Suddent Short Circuit of Three Phase Alternator - Analytical Solution

Lecture 42 - Suddent Short Circuit of Three Phase Alternator - Numerical Simulation

Lecture 43 - Course Recapitulation and Assignments

NPTEL : Analog ICs (Electrical Engineering)

Co-ordinators : Prof. K. Radhakrishna Rao

NPTEL : Digital Integrated Circuits (Electrical Engineering)

Co-ordinators : Prof. Amitava Dasgupta

NPTEL : Electromagnetic Fields (Electrical Engineering)

Co-ordinators : Prof. Harishankar Ramachandran

NPTEL : Networks and Systems (Electrical Engineering)

Co-ordinators : Prof. V.G.K. Murti

Lecture 32 - Network Functions - 3

Lecture 33 - Network Functions - 4

Lecture 34 - Network Theorems - 1

Lecture 35 - Network Theorems - 2

Lecture 36 - Network Theorems - 3

Lecture 37 - Network Theorems - 4

Lecture 38 - Discrete - Time Systems - 1

Lecture 39 - Discrete - Time Systems - 2

Lecture 40 - Discrete - Time Systems - 3

Lecture 41 - Discrete - Time Systems - 4

Lecture 42 - Discrete - Time Systems - 5

Lecture 43 - Discrete - Time Systems - 6

Lecture 44 - Discrete - Time Systems - 7

Lecture 45 - State-Variable Methods - 1

Lecture 46 - State-Variable Methods - 2

Lecture 47 - State Variable Methods - 3

Lecture 48 - State Variable Methods - 4

Lecture 49 - State Variable Methods - 5

Lecture 50 - State Variable Methods - 6

NPTEL : Probability Foundation for Electrical Engineers (Electrical Engineering)

Co-ordinators : Dr. Krishna Jagannathan

Lecture 32 - Examples of Random Variables

Lecture 33 - Continuous Random Variables - 1

Lecture 34 - Examples of Continuous Random Variables - 1

Lecture 35 - Continuous Random Variables - 2, Examples of Continuous RandomVariables - 2

Lecture 36 - Singular Random Variables

Lecture 37 - Several Random Variables - 1

Lecture 38 - Several Random Variables - 2

Lecture 39 - Independent Random Variables - 1

Lecture 40 - Independent Random Variables - 2

Lecture 41 - Conditional PMF, Jointly Continuous Random Variables - 1

Lecture 42 - Jointly Continuous Random Variables - 2

Lecture 43 - Jointly Continuous Random Variables - 3

Lecture 44 - Conditional CDF

Lecture 45 - Transformation of Random Variables - 1

Lecture 46 - Transformation of Random Variables - 2; Independent Random Variables

Lecture 47 - Sums of Discrete Random Variables

Lecture 48 - Sums of Jointly Continuous Random Variables

Lecture 49 - Sums of Random Number of Random Variables

Lecture 50 - General Transformations of Random Variables

Lecture 51 - Jacobian Formula

Lecture 52 - Examples Illustrating the use of Jacobian Formula

Lecture 53 - Introduction Integral and Expectation

Lecture 54 - Definition of the Abstract Integral

Lecture 55 - Simple Functions

Lecture 56 - Computing Expectation using Simple Functions, Properties of Integrals

Lecture 57 - Properties of Integrals (Continued....)

Lecture 58 - Inclusion Exclusion Formula using Indicator RVs and Expectation

Lecture 59 - Monotone Convergence Theorem - 1

Lecture 60 - Monotone Convergence Theorem - 2

Lecture 61 - Expectation of a Discrete Random Variable

Lecture 62 - Examples of Expectation of Discrete Random Variables

Lecture 63 - Expectation of Function of Random Variable

Lecture 64 - Some Examples of Computing Expectation

NPTEL : NOC:Analog Circuits (Electrical Engineering)

Co-ordinators : Dr. Nagendra Krishnapura

Lecture 131 - PNP transistor

NPTEL : NOC:Introduction to Non Linear Dynamics (Electrical Engineering)

Co-ordinators : Prof. Gaurav Raina

NPTEL : NOC:Control Engineering (Electrical Engineering)

Co-ordinators : Prof. Ramkrishna.P

NPTEL : NOC:Analog IC Design (Electrical Engineering)

Co-ordinators : Prof. S. Aniruddhan

NPTEL : NOC:Probability Foundations for Electrical Engineers (Electrical Engineering)

Co-ordinators : Prof. R.Aravind, Dr. Andrew Thangaraj

Lecture 1 - Experiments, Outcomes and Events

Lecture 2 - Examples: Experiments and sample spaces

Lecture 3 - Operations on Events

Lecture 4 - Examples: Sample spaces and events

Lecture 5 - Sigma Fields and Probability

Lecture 6 - Discrete Sample Spaces

Lecture 7 - Union and Partition

Lecture 8 - Examples: Probability Calculation for Equally likely Outcomes

Lecture 9 - Definition and Basic Properties

Lecture 10 - Bayes' Rule for Partitions

Lecture 11 - Examples: Conditional probability

Lecture 12 - Example of Detection

Lecture 13 - Example: Coloured Cards from a Box

Lecture 14 - Independence of Events

Lecture 15 - Examples: Independence

Lecture 16 - Combining Independent Experiments

Lecture 17 - Conditional Independence

Lecture 18 - Examples and Computations with Conditional Independence

Lecture 19 - Binomial and Geometric Models

Lecture 20 - Examples: Binomial and Geometric Model

Lecture 21 - Definition and Discrete Setting

Lecture 22 - RandomVariables and Events

Lecture 23 - Examples: Discrete random variables

Lecture 24 - Important distributions

Lecture 25 - Examples: Discrete PMFs

Lecture 26 - Real-life modeling example

Lecture 27 - More Distributions

Lecture 28 - Conditional PMFs, Conditioning on an event, Indicator random variables

Lecture 29 - Example: Conditioning on an event, Indicator random variables

Lecture 30 - Multiple random variables and joint distribution

Lecture 31 - Example: Two random variables

NPTEL : NOC:Introduction to Photonics (Electrical Engineering)

Co-ordinators : Prof. Balaji Srinivasan

NPTEL : NOC:Multirate DSP (Electrical Engineering)

Co-ordinators : Prof. David Kovil Pillai

NPTEL : NOC:LDPC and Polar Codes in 5G Standard (Electrical Engineering)

Co-ordinators : Dr. Andrew Thangaraj

NPTEL : NOC:Electromagnetic Compatibility, EMC (Electrical Engineering)

Co-ordinators : Prof. Daniel Mansson, Prof. Rajeev Thottappillil

NPTEL : NOC:Mapping Signal Processing Algorithms to Architectures (Electrical Engineering)

Co-ordinators : Prof. Nitin Chandrachoodan

NPTEL : NOC:Linear System Theory (Electrical Engineering)

Co-ordinators : Prof. Ramakrishna Pasumarthi

NPTEL : NOC:Digital Signal Processing (Electrical Engineering)

Co-ordinators : C. S. Ramalingam

NPTEL : NOC:Computational Electromagnetics (Electrical Engineering)

Co-ordinators : Prof. Uday Khankhoje

Lecture 65 - Computing Far Field

Lecture 66 - Numerical Aspects of 2D FEM

Lecture 67 - Summary of FEM Procedure

Lecture 68 - Introduction to FDTD

Lecture 69 - 2D FDTD Formulation : Stencil

Lecture 70 - 2D FDTD Formulation : Time Stepping

Lecture 71 - 2D FDTD Formulation : Divergence Conditions

Lecture 72 - Stability Criteria - Part 1

Lecture 73 - Stability Criteria - Part 2

Lecture 74 - Stability Criteria - Higher Dimensions

Lecture 75 - Accuracy Considerations - 1D

Lecture 76 - Accuracy Considerations - Higher Dimensions

Lecture 77 - Dealing with non-dispersive dielectric media

Lecture 78 - Dealing with dispersive dielectric media

Lecture 79 - Debye Model - Part 1

Lecture 80 - Debye Model - Part 2

Lecture 81 - Absorbing Boundary Conditions - 1D

Lecture 82 - Absorbing Boundary Conditions - 2D

Lecture 83 - Implementing ABC in FDTD

Lecture 84 - Failure of ABC

Lecture 85 - Perfectly Matched Layers (PML) - Introduction

Lecture 86 - Implementing PML using Coordinate Stretching

Lecture 87 - PML - Phase Matching

Lecture 88 - PML - Tangential Boundary Conditions

Lecture 89 - Perfectly Matched Interface

Lecture 90 - PML theory - Summary

Lecture 91 - Implementing PML into FDTD - Part 1

Lecture 92 - Implementing PML into FDTD - Part 2

Lecture 93 - Sources in FDTD - Currents

Lecture 94 - Sources in FDTD - Part 2

Lecture 95 - Summary of FDTD

Lecture 96 - MEEP : FDTD in action

Lecture 97 - Inverse Problems - Introduction

NPTEL : NOC:Transmission Lines and Electromagnetic Waves (Electrical Engineering)

Co-ordinators : Dr. Ananth Krishnan

NPTEL : NOC:Digital IC Design (Electrical Engineering)

Co-ordinators : Prof. Janakiraman

NPTEL : NOC:Power Management Integrated Circuits (Electrical Engineering)

Co-ordinators : Prof. Qadeer Ahmad Khan

Lecture 32 - Introduction to Switching Regulators

Lecture 33 - volt-second Balance, Non-Idealities in the Power Stage of a Buck Converter

Lecture 34 - Transformer Model of a Buck Converter, Conduction Efficiency, Efficiency of an LDO versus Efficiency of a Switching Regulator

Lecture 35 - Synchronous versus Non-Synchronous Switching Regulators, PWM Control Techniques

Lecture 36 - Losses in Switching Regulators (Conduction Loss, Gate-Driver Switching Loss)

Lecture 37 - Dead-Time Switching Loss in DC-DC Converters

Lecture 38 - Hard Switching Loss in DC DC Converters

Lecture 39 - Magnetic Loss in DC-DC Converters, Relative Significance of Losses as a Function of the Load Current

Lecture 40 - Output Voltage Ripple of a Buck Converter

Lecture 41 - Choosing the Inductor and Capacitor for a Buck Converter

Lecture 42 - CCM Vs DCM Operation in DC DC Converters

Lecture 43 - CCM DCM Boundary Condition, Voltage Conversion Ratio in DCM

Lecture 44 - Concept of Pulse Frequency Modulation PFM

Lecture 45 - Classification of Pulse Width Modulators

Lecture 46 - DC - DC Converter Control Techniques, Stability Analysis of Voltage Mode Buck Converter - Part 1

Lecture 47 - Stability Analysis of Voltage Mode Buck Converter - Part 2

Lecture 48 - Stability Analysis of Voltage Mode Buck Converter - Part 3

Lecture 49 - Dominant Pole Compensation (Type-I with Gm-C Architecture)

Lecture 50 - Dominant Pole Compensation (Type-I with Op Amp-RC Architecture)

Lecture 51 - Introduction to Type-II Compensation

Lecture 52 - Type-II Compensator using Gm-C Architecture - Part 1

Lecture 53 - Type-II Compensator using Gm-C Architecture - Part 2

Lecture 54 - Type-II Compensator using Gm-C Architecture - Part 3

Lecture 55 - Type-II Compensator using Op Amp-RC Architecture

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Lecture 57 - Type-III Compensator using Op Amp-RC Architecture

Lecture 58 - Simulation of DC-DC Converter with Type-III Compensator

Lecture 59 - Type-III Compensator using Gm-C Architecture

Lecture 60 - Feed-Forward Line Compensation, Loop Gain Compensation by Modulating Gm

Lecture 61 - Designing a Buck Converter, Power Loss Budgeting

Lecture 62 - Sizing Power MOSFETs

Lecture 63 - Estimating Switching Losses and Choosing the Switching Frequency

NPTEL : NOC:DC Power Transmission Systems (Electrical Engineering)

Co-ordinators : Prof. Krishna S

NPTEL : NOC:Optical Engineering (Electrical Engineering)

Co-ordinators : Prof. Shanti Bhattacharya

NPTEL : NOC:Nonlinear System Analysis (Electrical Engineering)

Co-ordinators : Dr. Arun D. Mahindrakar, Prof. Ramkrishna Pasumarthy

NPTEL : NOC:Signals and Systems (Electrical Engineering)

Co-ordinators : Prof. Kushal K. Shah

NPTEL : NOC:Linear Dynamical Systems (Electrical Engineering)

Co-ordinators : Prof. Tushar Jain

NPTEL : NOC:A brief Introduction of Micro-Sensors (Electrical Engineering)

Co-ordinators : Prof. Santanu Talukder

NPTEL : NOC:Fiber Optic Communication Technology (Electrical Engineering)

Co-ordinators : Prof. Deepa Venkitesh

Lecture 65 - Photodetectors concepts

Lecture 66 - p-n and p-i-n Photodetectors

Lecture 67 - Avalance Photodetector

Lecture 68 - Direct detection receiver and sources of noise

Lecture 69 - Quantifying noises in direct detection receivers

Lecture 70 - SNR and Operation Regimes

Lecture 71 - Noise Equivalent power and SNR in APDs

Lecture 72 - Coherent Receivers

Lecture 73 - SNR analysis of coherent receivers

Lecture 74 - Performance Evaluation - 1

Lecture 75 - Performance Evaluation - 2

Lecture 76 - Performance Metrics: BER,Q, and Receiver Sensitivity

Lecture 77 - Performance Metrics:Q and SNR

Lecture 78 - Quantum limit of photodetection

Lecture 79 - Optical Amplifier

Lecture 80 - Erbium doped fiber amplifier - 1

Lecture 81 - Erbium doped fiber amplifier - 2

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Lecture 85 - Link Design - Case Study

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Lecture 87 - Dispersion - Recap

Lecture 88 - Dispersion Compensation - Pulse Propagation with disperison

Lecture 89 - Pulse propagation - 2

Lecture 90 - Dispersion Compensation - Dispersion Transfer Function

Lecture 91 - Dispersion Compensation - Case Study

Lecture 92 - Dispersion COmpensation - WDM and DSP

Lecture 93 - Nonlinear Effects- Nonlinear refractive Index

Lecture 94 - Self Phase Modulation

Lecture 95 - Cross Phase Modulation

Lecture 96 - Scattering Processes in optical fibers

Lecture 97 - Stimulated Brillouin Scattering

NPTEL : NOC:Image Signal Processing (Electrical Engineering)

Co-ordinators : Prof. A. N. Rajagopalan

NPTEL : NOC:Fundamentals of Electric Vehicles: Technology and Economics (Electrical Engineering)

Co-ordinators : Prof. Ashok Jhunjhunwala, Prof. Prabhjot Kaur, Prof. Kaushal Kumar Jha, Prof. L Kannan

NPTEL : NOC:Applied Linear Algebra (Electrical Engineering)

Co-ordinators : Prof. Andrew Thangaraj

NPTEL : NOC:Basic Electrical Circuits (Electrical Engineering)

Co-ordinators : Dr. Nagendra Krishnapura

NPTEL : NOC:Optical Fiber Sensors (Electrical Engineering)

Co-ordinators : Prof. Balaji Srinivasan

Lecture 32 - Wavelength modulated sensors - 1

Lecture 33 - Wavelength modulated sensors - 2

Lecture 34 - Wavelength modulated sensors - 3

Lecture 35 - Wavelength modulated sensors - 4

Lecture 36 - Wavelength modulated sensors - 5

Lecture 37 - Wavelength modulated sensors - 6

Lecture 38 - Wavelength modulated sensors - 7

Lecture 39 - Wavelength modulated sensors - 8

Lecture 40 - Polarization modulated sensors - 1

Lecture 41 - Polarization modulated sensors - 2

Lecture 42 - Polarization modulated sensors - 3

NPTEL : NOC:Introduction to Time - Varying Electrical Networks (Electrical Engineering)

Co-ordinators : Prof. Shanthi Pavan

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 noise in electrical networks

Lecture 18 - Noise processed by a linear time-invariant system

Lecture 19 - kT/C noise in a sample-and-hold circuit

Lecture 20 - Noise in RLC networks

Lecture 21 - Total integrated noise in RLC Networks

Lecture 22 - Bode's Noise Theorem - Frequency domain

Lecture 23 - Input referred noise in electrical networks - Part 1

Lecture 24 - Input referred noise in electrical networks - Part 2

Lecture 25 - Input referred noise and the noise factor

Lecture 26 - Noise Factor Examples

Lecture 27 - Motivation to learn about time-varying circuits and systems - Part 1

Lecture 28 - Motivation to learn about time-varying circuits and systems - Part 2

Lecture 29 - Convolution integral for LTV systems

Lecture 30 - Frequency response of an LTV system

Lecture 31 - LTV system example : Time-varying RC filter

Lecture 32 - Linear Periodically Time-Varying Systems (LPTV)

Lecture 33 - Response of an LPTV system to a complex exponential input

Lecture 34 - Harmonic Transfer Functions

Lecture 35 - Zadeh expansion of an LPTV system

Lecture 36 - MNA analysis of LPTV networks

Lecture 37 - MNA stamp of a periodically time varying conductance

Lecture 38 - MNA stamp of a capacitor and a voltage source in an LPTV network

Lecture 39 - Analysis of an example LPTV network - Part 1

Lecture 40 - Analysis of an example LPTV network - Part 2

Lecture 41 - LPTV network analysis, RC filter, time-varying

Lecture 42 - Impedance and admittance in LTI and LPTV networks

Lecture 43 - Thevenin and Norton's Theorems for LPTV networks

Lecture 44 - The N-path principle

Lecture 45 - N-path example

Lecture 46 - Time-domain intuition of the N-path principle

Lecture 47 - N-path example: Time-Interleaved ADCs

Lecture 48 - Dc-dc converter as an LPTV system

Lecture 49 - N-path principle: Multiphase dc-dc converter

Lecture 50 - The N-path filter

Lecture 51 - Computing H_0(j2\pi f_s) for a 4-path filter

Lecture 52 - Input impedance of the 4-path filter at f_s

Lecture 53 - Computing H_0(j2\pi 2 f_s) for a 4-path filter

Lecture 54 - Determining H_0 for input frequency deviations from f_s

Lecture 55 - Reciprocity and Inter-reciprocity in LPTV networks : Part 1

Lecture 56 - Reciprocity and Inter-reciprocity in LPTV networks : Part 2, the transfer-function theorem

Lecture 57 - Why is the transfer-function theorem important?

Lecture 58 - The frequency-reversal theorem for inter-reciprocal (adjoint) LPTV networks : introduction

Lecture 59 - The frequency-reversal theorem for inter-reciprocal (adjoint) LPTV networks : derivation

Lecture 60 - Why is the frequency-reversal theorem important?

Lecture 61 - Inter-reciprocity in signal-flow graphs

Lecture 62 - Applications of inter-reciprocity: analysis of chopped amplifiers

Lecture 63 - Applications of inter-reciprocity: analysis of chopped amplifiers (Continued...)

Lecture 64 - Applications of inter-reciprocity: chopping with square-wave modulation

NPTEL : NOC:Digital System Design (Electrical Engineering)

Co-ordinators : Prof. Neeraj Goel

NPTEL : NOC:Stochastic Modeling and the Theory of Queues (Electrical Engineering)

Co-ordinators : Prof. Krishna Jagannathan

NPTEL : NOC:Integrated Photonics Devices and Circuits (Electrical Engineering)

Co-ordinators : Prof. Bijoy Krishna Das

NPTEL : NOC:Introduction to Semiconductor Devices (Electrical Engineering)

Co-ordinators : Prof. Naresh Kumar Emani

NPTEL : NOC:Electric Vehicles and Renewable Energy (Electrical Engineering)

Co-ordinators : Prof. Ashok Jhunjhunwala, Prof. Prabhjot Kaur, Prof. Kaushal Kumar Jha, Prof. L Kannan

NPTEL : Phase-locked loops (Electrical Engineering)

Co-ordinators : Dr. Saurabh Saxena

Lecture 65 - Course Summary

NPTEL : NOC:Fundamentals of Nano and Quantum Photonics (Electrical Engineering)

Co-ordinators : Prof. Naresh Kumar Emani

NPTEL : NOC:Analog Electronic Circuits (IITM) (Electrical Engineering)

Co-ordinators : Prof. Shanthi Pavan

NPTEL : NOC:Modern Computer Vision (Electrical Engineering)

Co-ordinators : Prof. A. N. Rajagopalan

NPTEL : NOC:Optical Wireless Communications for Beyond 5G Networks and IoT (Electrical Engineering)

Co-ordinators : Prof. Anand Srivastava

NPTEL : NOC:VLSI Design Flow: RTL to GDS (Electrical Engineering)

Co-ordinators : Prof. Sneh Saurabh

NPTEL : NOC:Fundamentals of Wireless Communication (Hindi) (Electrical Engineering)

Co-ordinators : Dr.Vivek Bohara

NPTEL : NOC:Sensor Technologies: Physics, Fabrication, and Circuits (Electrical Engineering)

Co-ordinators : Prof.Mitradip Bhattacharjee

NPTEL : NOC:Optimal Control (Electrical Engineering)

Co-ordinators : Prof. Barjeev Tyagi

Lecture 1 - Introduction and Performance Index

Lecture 2 - Basic Concepts of Calculus of Variation

Lecture 3 - The Basic Variational Problem

Lecture 4 - Fixed End Point Problem

Lecture 5 - Free End Point Problem

Lecture 6 - Free End Point Problem (Continued...)

Lecture 7 - Free End Point Problem (Continued...)

Lecture 8 - Free End Point Problem (Continued...)

Lecture 9 - Optimum of Functions with Conditions

Lecture 10 - Optimum of Functions with Conditions (Lagrange Multiplier Method)

Lecture 11 - Optimum of Functional with Conditions

Lecture 12 - Variational Approach to Optimal Control Systems

Lecture 13 - Variational Approach to Optimal Control Systems (Continued...)

Lecture 14 - Linear Quadratic Optimal Control Systems

Lecture 15 - Linear Quadratic Optimal Control Systems (Continued...)

Lecture 16 - Linear Quadratic Optimal Control Systems (Continued...)

Lecture 17 - Linear Quadratic Optimal Control Systems (Continued...)

Lecture 18 - Linear Quadratic Optimal Control Systems (Continued...)

Lecture 19 - Linear Quadratic Optimal Control Systems (Optimal Value of Performance Index)

Lecture 20 - Infinite Horizon Regulator Problem

Lecture 21 - Infinite Horizon Regulator Problem (Continued...)

Lecture 22 - Analytical Solution of MDRE - State Transition Matrix Approach

Lecture 23 - Analytical Solution of MDRE - Similarity Transformation Approach

Lecture 24 - Analytical Solution of MDRE - Similarity Transformation Approach (Continued...)

Lecture 25 - Frequency Domain Interpretation of LQR - Linear Time Invariant System

Lecture 26 - Frequency Domain Interpretation of LQR - Linear Time Invariant System (Continued...)

Lecture 27 - LQR with a Specified Degree of Stability

Lecture 28 - Inverse Matrix Riccati Equation

Lecture 29 - Linear Quadratic Tracking System

Lecture 30 - Discrete-Time Optimal Control Systems

Lecture 31 - Discrete-Time Optimal Control Systems (Continued...)

NPTEL : NOC:Basics of Software Defined Radios and Practical Applications (Electrical Engineering)

Co-ordinators : Dr. Meenakshi Rawat

NPTEL : NOC:Electrical Distribution System Analysis (Electrical Engineering)

Co-ordinators : Prof. G. B. Kumbhar

NPTEL : NOC:Introduction to Smart Grid (Electrical Engineering)

Co-ordinators : Prof. Premalata Jena, Prof. N.P. Padhy

NPTEL : NOC:Facts Devices (Electrical Engineering)

Co-ordinators : Prof. Avik Bhattacharya

NPTEL : NOC:Advanced Linear Continuous Control Systems: Applications with MATLAB Programming and Simulink (Electrical Engineering)

Co-ordinators : Prof. Yogesh Vijay Hote

NPTEL : NOC:Computer Aided Power System Analysis (Electrical Engineering)

Co-ordinators : Prof. Biswarup Das

Lecture 32 - Introduction to Contingency Analysis

Lecture 33 - Linear Sensitivity Factor

Lecture 34 - Linear Sensitivity Factors (Continued...)

Lecture 35 - Line outage sensitivity factor

Lecture 36 - Line outage sensitivity factor (Continued...)

Lecture 37 - Line outage sensitivity factor (Continued...)

Lecture 38 - State Estimation Technique

Lecture 39 - Weighted Least Square (WLS) Method

Lecture 40 - WLS (Continued...)

Lecture 41 - WLS Examples

Lecture 42 - Error Analysis

Lecture 43 - Error Analysis (Continued...)

Lecture 44 - Bad Data Detection

Lecture 45 - Power system state estimation

Lecture 46 - Power system state estimation (Continued...)

Lecture 47 - Power system state estimation (Continued...)

Lecture 48 - Power system state estimation (Continued...)

Lecture 49 - Fault Analysis

Lecture 50 - Fault Analysis (Continued...)

Lecture 51 - Fault Analysis (Continued...)

Lecture 52 - Fault Analysis (Continued...)

Lecture 53 - Fault Analysis (Continued...)

Lecture 54 - Fault Analysis (Continued...)

Lecture 55 - Fault Analysis (Continued...)

Lecture 56 - Fault Analysis (Continued...)

Lecture 57 - Fault Analysis (Continued...)

Lecture 58 - Fault Analysis (Continued...)

Lecture 59 - Fault Analysis (Continued...)

Lecture 60 - Fault Analysis (Continued...)

NPTEL : NOC:Advance Power Electronics and Control (Electrical Engineering)

Co-ordinators : Prof. Avik Bhattacharya

NPTEL : NOC:CMOS Digital VLSI Design (Electrical Engineering)

Co-ordinators : Prof. Sudeb Dasgupta

NPTEL : NOC:Microelectronics: Devices to Circuits (Electrical Engineering)

Co-ordinators : Prof. Sudeb Dasgupta

NPTEL : NOC:DC Microgrid (Electrical Engineering)

Co-ordinators : Prof. Avik Bhattacharya

NPTEL : NOC:Power Quality Improvement Technique (Electrical Engineering)

Co-ordinators : Prof. Avik Bhattacharya

NPTEL : NOC:Power System Protection and Switchgear (Electrical Engineering)

Co-ordinators : Prof. Bhaveshkumar R. Bhalja

NPTEL : An Introduction to Electronics Systems Packaging (Electrical Engineering)

Co-ordinators : Prof. G.V. Mahesh

NPTEL : Power Electronics and Distributed Generation (Electrical Engineering)

Co-ordinators : Dr. Vinod John

NPTEL : Pulse width Modulation for Power Electronic Converters (Electrical Engineering)

Co-ordinators : Dr. G. Narayanan

NPTEL : Switched Mode Power Conversion (Electrical Engineering)

Co-ordinators : Prof. L. Umanand, Prof. V. Ramanarayanan

NPTEL : Basic Electrical Technology (Electrical Engineering)

Co-ordinators : Prof. L. Umanand

NPTEL : Industrial Drives - Power Electronics (Electrical Engineering)

Co-ordinators : Prof. K. Gopakumar

NPTEL : NOC:Design for Internet of Things (Electrical Engineering)

Co-ordinators : Prof. T.V. Prabhakar

NPTEL : NOC:Advances in UHV Transmission and Distribution (Electrical Engineering)

Co-ordinators : Prof Subba Reddy B

NPTEL : NOC:Mathematical Methods and Techniques in Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Shayan Srinivasa Garani

NPTEL : NOC:Electronics Enclosures Thermal Issues (Electrical Engineering)

Co-ordinators : Prof. N. V Chalapathi Rao

NPTEL : NOC:Integrated Circuits, MOSFETs, Op-Amps and their Applications (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

NPTEL : NOC:Semiconductor Devices and Circuits (Electrical Engineering)

Co-ordinators : Prof. Sanjiv Sambandan

NPTEL : NOC:Fabrication Techniques for MEMs-based Sensors: Clinical Perspective (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

NPTEL : NOC:Op-Amp Practical Applications: Design, Simulation and Implementation (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

NPTEL : NOC:Physical Modelling for Electronics Enclosures using Rapid prototyping (Electrical Engineering)

Co-ordinators : Prof. N. V Chalapathi Rao

NPTEL : NOC:Recent Advances in Transmission Insulators (Electrical Engineering)

Co-ordinators : Prof Subba Reddy B

NPTEL : NOC:Fundamentals of Semiconductor Devices (Electrical Engineering)

Co-ordinators : Prof. Digbijoy N. Nath

NPTEL : NOC:Advanced IOT Applications (Electrical Engineering)

Co-ordinators : Prof. T V Prabhakar

NPTEL : NOC:Electronic Systems for Cancer Diagnosis (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

NPTEL : NOC:Electronic Modules for Industrial Applications using Op-Amps (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

NPTEL : NOC:Sensors and Actuators (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

Lecture 31 - Demonstration of Microheaters in COMSOL Multiphysics

Lecture 32 - Introduction to Cleanroom facilities for biomedical applications

Lecture 33 - Physical Deposition Techniques

Lecture 34 - Demonstration on peristaltic pump in cleanroom

Lecture 35 - Installation of Oxygen Plasma System

Lecture 36 - Demonstration of IR Based Sensor using Arduino

Lecture 37 - Illustration of fabricated Microfluidic Device for biochips with PDMS moulding

Lecture 38 - Photolithography - Part 2

Lecture 39 - Photolithography - Part 3

Lecture 40 - Introduction and Demonstration of Shape Memory Alloy

Lecture 41 - Applications of Shape Memory Alloy as a light weight actuators

Lecture 42 - Discussion on Fabricated Sensor with Silicon as Substrate

Lecture 43 - Discussion and Microscopic Inspection of Fabricated Sensor with Silicon as a Substrate

Lecture 44 - Tissue Deparaffinization for Biosensors

Lecture 45 - Clean room guidelines and Cancer Dianostic tool

Lecture 46 - Basics of Pressure Sensor and Demonstration using Arduino Microcontroller

Lecture 47 - Basics of Stepper Motor and Demonstration using Arduino Microcontroller

Lecture 48 - Microscopic Inspection of Diced wafers and CNT Sensing Layer for fabricated sensor

Lecture 49 - Process flow for Microcantilever for Mechanical Phenotyping of breast cancer tissues

Lecture 50 - Applications of microcantilever for Mechanical Phenotyping of breast cancer tissues

Lecture 51 - Installation and Introduction to Physical Vapour Deposition System

Lecture 52 - Human Machine Interface for Controlling Deposition System

Lecture 53 - Flexible MEMS for phenotyping tissue properties - I

Lecture 54 - Flexible MEMS for phenotyping tissue properties - II

Lecture 55 - System Demonstration for Physical Vapor Deposition

Lecture 56 - Introduction to CAD Modelling - I

Lecture 57 - Introduction to CAD Modelling - II

Lecture 58 - Biosensors for ETM Phenotyping of breast cancer tissues for better prognosis

Lecture 59 - Biosensors for Electrothermal sensor

Lecture 60 - MEMS based sensor for catheter contact force measurement

Lecture 61 - Microfluidics based Drug Screening

Lecture 62 - Basic aspects of 3D Printing

Lecture 63 - 3D Printing Materials and Demonstration of Remote 3D Printing

NPTEL : NOC:Neural Networks for Signal Processing-I (Electrical Engineering)

Co-ordinators : Prof. Shayan Srinivasa Garani

NPTEL : NOC:Electronics Equipment Integration and Prototype Building (Electrical Engineering)

Co-ordinators : Prof. N.V.Chalapathi Rao

NPTEL : NOC:Design and Simulation of Power Conversion using Open Source Tools (Electrical Engineering)

Co-ordinators : Prof. L. Umanand

NPTEL : NOC:Introductory Neuroscience and Neuro-Instrumentation (Electrical Engineering)

Co-ordinators : Prof. Mahesh Jayachandra

Lecture 1 - Cellular (Microscopic) Structure of the Central Nervous System (CNS)

Lecture 2 - Anatomical (Macroscopic) structure of the CNS

Lecture 3 - Introduction to Cleanroom and IC Fabrication Techniques

Lecture 4 - Introduction to EEG applications for Hearing Loss

Lecture 5 - Electrophysiological Recordings

Lecture 6 - Neocortical Circuits

Lecture 7 - The resting Membrane Potential

Lecture 8 - Applications of MEMS Fabrication Technologies

Lecture 9 - Fundamentals of biopotentials and applications

Lecture 10 - Fundamentals of EEG and applications

Lecture 11 - The Action Potential (1)

Lecture 12 - The Action Potential (2)

Lecture 13 - Axonology, Neuronal Biophysics (1)

Lecture 14 - Axonology, Neuronal Biophysics (2)

Lecture 15 - Experimental Setup for EEG Recording

Lecture 16 - Introduction to Cleanroom Protocols and Demonstration of Gowning Procedure

Lecture 17 - Electromagnetic Stimulation of the Brain (1)

Lecture 18 - Electromagnetic Stimulation of the Brain (2)

Lecture 19 - Introduction to Event Related Potentials

Lecture 20 - Introduction to 3D Printing

Lecture 21 - 3D Printing: Applications and Demonstrations

Lecture 22 - Introduction to Event Related Potentials (2)

Lecture 23 - Different Event Related Potentials (1)

Lecture 24 - Different Event Related Potentials (2)

Lecture 25 - Introduction to Silicone Wafer Processing Techniques

Lecture 26 - Basics of Silicone Dioxide: Oxidation, Characterization and Applications

Lecture 27 - Inverse Problem, EEG source localization (1)

Lecture 28 - Inverse Problem, EEG source localization (2)

Lecture 29 - Introduction to Brain Computer Interfaces

Lecture 30 - Signal Conditioning Circuit for EEG Bioamplifiers

Lecture 31 - Basics of BCI Experimentation: Introdcution BCI Applications

Lecture 32 - Different Brain Computer Interfaces

Lecture 33 - Introduction to EEGLAB, ERPLAB and AEP Demonstration (1)

Lecture 34 - Introduction to EEGLAB, ERPLAB and AEP Demonstration (2)

Lecture 35 - Introduction to Photolithography

Lecture 36 - Basics of BCI Experimentation: Stimuli Generation and Insertion

Lecture 37 - MMN Demonstration with EEGLAB and ERPLAB (1)

Lecture 38 - MMN Demonstration with EEGLAB and ERPLAB (2)

Lecture 39 - Introduction to Photolithography (2)

Lecture 40 - Basics of Instrumentation Amplifier and Online Simulation

Lecture 41 - Basics of BCI Experimentation: Experimental Setup and Biopotential Acquisition

Lecture 42 - P300 Demonstration with EEGLAB/ERPLAB (1)

Lecture 43 - P300 Demonstration with EEGLAB/ERPLAB (2)

Lecture 44 - Wavelet Analysis with VEP (1)

Lecture 45 - Details of Lithography, E-beam Lithography and Mask Aligner

Lecture 46 - Basics of BCI Experimentation: Signal Acquisition using MATLAB (EEGLAB)

Lecture 47 - Wavelet Analysis with VEP (2)

Lecture 48 - Demonstration: Resting Membrane Potential

Lecture 49 - Demonstration: Membrane Time Constant (Ï„)

Lecture 50 - Photoresist (SU-8) and soft lithography

Lecture 51 - Physical Vapour Deposition: Thermal Evaporation

Lecture 52 - Introduction to Epilepsy and Classification

Lecture 53 - Epileptogenisis

Lecture 54 - Demonstration: Membrane Length Constant (Î»)

Lecture 55 - Demonstration: Action Potential

Lecture 56 - Demonstration: Voltage Clamp

Lecture 57 - Demonstration: Synaptic Potentials & Current

Lecture 58 - Physical Vapour Deposition: E-beam Evaporation

Lecture 59 - Physical Vapour Deposition: Sputtering

Lecture 60 - Recent Trends: Epilepsy Classification using EEG data

Lecture 61 - Demonstration: Wireless EEG with dry electrodes

Lecture 62 - Basics of EEG, ERP and acquisition

Lecture 63 - Photolithography with example

Lecture 64 - Stress Tissue Analysis using COMSOL Multiphysics

Lecture 65 - Recent Trends: Microelectrode Arrays and Deep Brain Stimulation

NPTEL : NOC:Information Theory (Electrical Engineering)

Co-ordinators : Prof. Himanshu Tyagi

NPTEL : NOC:Photonic Integrated Circuit (Electrical Engineering)

Co-ordinators : Prof. Shankar Kumar Selvaraja

NPTEL : NOC:Design for Internet of Things (2021) (Electrical Engineering)

Co-ordinators : Prof. T V Prabhakar

NPTEL : NOC:Mathematical Aspects of Biomedical Electronic System Design (Electrical Engineering)

Co-ordinators : Prof. Chandramani Singh

NPTEL : NOC:Concentration Inequalities (Electrical Engineering)

Co-ordinators : Prof. Himanshu Tyagi

NPTEL : NOC:Real-Time Digital Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Rathna G N

NPTEL : NOC:Advanced Neural Science for Engineers (Electrical Engineering)

Co-ordinators : Prof. Vikas V

NPTEL : NOC:Design of Electric Motors (Electrical Engineering)

Co-ordinators : Dr. Prathap Reddy