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

Lecture 32 - Power Electronics

Lecture 33 - Power Electronics

Lecture 34 - Power Electronics

Lecture 35 - Power Electronics

Lecture 36 - Power Electronics

Lecture 37 - Power Electronics

Lecture 38 - Power Electronics

Lecture 39 - Power Electronics

Lecture 40 - Power Electronics

Lecture 41 - Power Electronics

Lecture 42 - Power Electronics

Lecture 43 - Power Electronics

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

Lecture 65 - Lecture 33

Lecture 66 - Lecture 34

Lecture 67 - Lecture 35

Lecture 68 - Exercise 20

Lecture 69 - Lab tour 5

Lecture 70 - Summary week 10

Lecture 71 - Lecture 36

Lecture 72 - Lecture 37

Lecture 73 - Lecture 38

Lecture 74 - Lecture 39

Lecture 75 - Lecture 40

Lecture 76 - Summary week 11

Lecture 77 - Lecture 41

Lecture 78 - Lecture 42

Lecture 79 - Lecture 43

Lecture 80 - Lecture 44

Lecture 81 - Exercise 21

Lecture 82 - Exercise 22

Lecture 83 - Summary week 12

NPTEL : NOC:Basic Electronics (Electrical Engineering)

Co-ordinators : Prof. Mahesh B. Patil

NPTEL : NOC:Antennas (Electrical Engineering)

Co-ordinators : Prof. Girish Kumar

Lecture 1 - Antenna Introduction - I

Lecture 2 - Antenna Introduction - II

Lecture 3 - Antenna Introduction - III

Lecture 4 - Antenna Fundamentals - I

Lecture 5 - Antenna Fundamentals - II

Lecture 6 - Antenna Radiation Hazards - I

Lecture 7 - Antenna Radiation Hazards - II

Lecture 8 - Dipole Antennas - I

Lecture 9 - Dipole Antennas - II

Lecture 10 - Dipole Antennas - III

Lecture 11 - Monopole Antennas - I

Lecture 12 - Monopole Antennas - II

Lecture 13 - Loop Antennas

Lecture 14 - Slot Antennas

Lecture 15 - Linear Arrays - I

Lecture 16 - Linear Arrays - II

Lecture 17 - Linear Arrays - III

Lecture 18 - Planar Arrays

Lecture 19 - Microstrip Antennas (MSA)

Lecture 20 - Rectangular MSA

Lecture 21 - MSA Parametric Analysis - I

Lecture 22 - MSA Parametric Analysis - II

Lecture 23 - Circular MSA

Lecture 24 - Broadband MSA - I

Lecture 25 - Broadband MSA - II

Lecture 26 - Broadband MSA - III

Lecture 27 - Broadband MSA - IV

Lecture 28 - Broadband MSA - V

Lecture 29 - Compact MSA - I

Lecture 30 - Compact MSA - II

Lecture 31 - Compact MSA - III

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

Co-ordinators : Prof. V.M. Gadre

Lecture 32 - Module 10 - Lecture 2 - Up sampling by a general factor M- a Z-domain analysis.

Lecture 33 - Module 10 - Lecture 3 - Down sampling by a general factor M- a Z-domain analysis

Lecture 34 - Module 11 - Lecture 1 - Z domain analysis of 2 channel filter bank.

Lecture 35 - Module 11 - Lecture 2 - Effect of X (-Z) in time domain and aliasing

Lecture 36 - Module 11 - Lecture 3 - Consequences of aliasing and simple approach to avoid it

Lecture 37 - Module 12 - Lecture 1 - Revisiting aliasing and the Idea of perfect reconstruction

Lecture 38 - Module 12 - Lecture 2 - Applying perfect reconstruction and alias cancellation on Haar MRA

Lecture 39 - Module 12 - Lecture 3 - Introduction to Daubechies family of MRA

Lecture 40 - Module 13 - Lecture 1 - Power Complementarity of low pass filter

Lecture 41 - Module 13 - Lecture 2 - Applying perfect reconstruction condition to obtain filter coefficient

Lecture 42 - Module 14 - Lecture 1 - Effect of minimum phase requirement on filter coefficients

Lecture 43 - Module 14 - Lecture 2 - Building compactly supported scaling functions

Lecture 44 - Module 14 - Lecture 3 - Second member of Daubechies family

Lecture 45 - Module 15 - Lecture 1 - Fourier transform analysis of Haar scaling and Wavelet functions

Lecture 46 - Module 15 - Lecture 2 - Revisiting Fourier Transform and Parseval's theorem

Lecture 47 - Module 15 - Lecture 3 - Transform Analysis of Haar Wavelet function

Lecture 48 - Module 16 - Lecture 1 - Nature of Haar scaling and Wavelet functions in frequency domain

Lecture 49 - Module 16 - Lecture 2 - The Idea of Time-Frequency Resolution

Lecture 50 - Module 16 - Lecture 3 - Some thoughts on Ideal time- frequency domain behavior

Lecture 51 - Module 17 - Lecture 1 - Defining Probability Density function

Lecture 52 - Module 17 - Lecture 2 - Defining Mean, Variance and Â“containment in a given domainÂ”

Lecture 53 - Module 17 - Lecture 3 - Example: Haar Scaling function

Lecture 54 - Module 17 - Lecture 4 - Variance from a slightly different perspective

Lecture 55 - Module 18 - Lecture 1 - Signal transformations: effect on mean and variance

Lecture 56 - Module 18 - Lecture 2 - Time-Bandwidth product and its properties

Lecture 57 - Module 18 - Lecture 3 - Simplification of Time-Bandwidth formulae

Lecture 58 - Module 19 - Lecture 1 - Introduction

Lecture 59 - Module 19 - Lecture 2 - Evaluation of Time-Bandwidth product

Lecture 60 - Module 19 - Lecture 3 - Optimal function in the sense of Time-Bandwidth product

Lecture 61 - Module 20 - Lecture 1 - Discontent with the Â“Optimal functionÂ”.

Lecture 62 - Module 20 - Lecture 2 - Journey from infinite to finite Time-Bandwidth product of Haar scaling function

Lecture 63 - Module 20 - Lecture 3 - More insights about Time-Bandwidth product

Lecture 64 - Module 20 - Lecture 4 - Time-frequency plane

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

Lecture 32 - Microwave Amplifiers - I: Basics and Power Gain Expressions

Lecture 33 - Microwave Amplifiers - II: Stability and Constant Gain Circles

Lecture 34 - Microwave Amplifiers - III: Design Example

Lecture 35 - Low Noise Amplifiers - I: Noise Sources and Noise Figure

Lecture 36 - Low Noise Amplifiers - II: NF Circles and LNA Design

Lecture 37 - Power Amplifiers

Lecture 38 - Microwave Tubes - I : Linear Beam Tubes- Two Cavity Klystron

Lecture 39 - Microwave Tubes - II: Linear Beam Tubes- Reflex Klystron and TWT

Lecture 40 - Microwave Tubes - III: Crossed Field Tubes- Magnetron

Lecture 41 - Microwave Oscillators - I

Lecture 42 - Microwave Oscillators - II

Lecture 43 - Microwave Mixers - I: Fundamentals

Lecture 44 - Microwave Mixers - II: Circuits

Lecture 45 - Microwave Mixers - III: Design

Lecture 46 - Fundamentals of Antennas

Lecture 47 - Dipole, Monopole, loop and Slot Antennas

Lecture 48 - Linear and Planar Arrays

Lecture 49 - Microstrip Antennas

Lecture 50 - Horn and Helical Antennas

Lecture 51 - Yagi - Uda, Log-Periodic and Reflector Antennas

Lecture 52 - RF MEMS and Microwave Imaging

Lecture 53 - Microwave Systems

Lecture 54 - Microwave Measurements and Lab Demonstration

Lecture 55 - CST Software Introduction with Filter Design

Lecture 56 - Power Divider and Combiner Design in CST

Lecture 57 - Hybrid Coupler Design

Lecture 58 - Antenna Design and Amplifier Simulation in CST

Lecture 59 - Mixer Design in NI AWR Software - I

Lecture 60 - Mixer Design in NI AWR Software - II

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

Lecture 65 - Chebychev filter Derivation

Lecture 66 - Midsem paper review discussion

Lecture 67 - The Chebyschev Approximation

Lecture 68 - Next step in design: Obtain poles

Lecture 69 - Introduction to Frequency Transformations in the Analog Domain

Lecture 70 - High pass transformation

Lecture 71 - Band pass transformation

Lecture 72 - Frequency Transformation

Lecture 73 - Different types of filters

Lecture 74 - Impulse invariant method and ideal impulse response

Lecture 75 - Design of FIR of length (2N+1) by the truncation method,Plotting the function V(w)

Lecture 76 - IIR filter using rectangular window, IIR filter using triangular window

Lecture 77 - Proof that frequency response of an fir filter using rectangular window function centred at 0 is real

Lecture 78 - Introduction to window functions

Lecture 79 - Examples of window functions

Lecture 80 - Explanation of Gibbâ€™s Phenomenon and itâ€™s application

Lecture 81 - Comparison of FIR And IIR Filterâ€™s

Lecture 82 - Comparison of FIR And IIR Filterâ€™s

Lecture 83 - Comparison of FIR And IIR Filterâ€™s

Lecture 84 - Introduction and approach to realization (causal rational system)

Lecture 85 - Comprehension of Signal Flow Graphs and Achievement of Pseudo Assembly Language Code

Lecture 86 - Introduction to IIR Filter Realization and Cascade Structure

Lecture 87 - Cascade Parallel Structure

Lecture 88 - Lattice Structure

Lecture 89 - Recap And Review of Lattice Structure, Realization of FIR Function

Lecture 90 - Backward recursion, Change in the recursive equation of lattice

Lecture 91 - Lattice structure for an arbitrary rational system

Lecture 92 - Example realization of lattice structure for rational system

Lecture 93 - Introductory Remarks of Discrete Fourier Transform and Frequency Domain Sampling

Lecture 94 - Principle of Duality, The Circular Convolution

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

Co-ordinators : Prof. Ankur A. Kulkarni

Lecture 65 - Communication Theory - V

NPTEL : NOC:Applied Linear Algebra (2024) (Electrical Engineering)

Co-ordinators : Prof. Dwaipayan Mukherjee

Lecture 1 - Introduction - Part A

Lecture 2 - Introduction - Part B

Lecture 3 - Introduction - Part C

Lecture 4 - Equivalent Systems - Part A

Lecture 5 - Equivalent Systems - Part B

Lecture 6 - Equivalent Systems - Part C

Lecture 7 - Solution of Ax = b - Part A

Lecture 8 - Solution of Ax = b - Part B

Lecture 9 - Solution of Ax = b - Part C

Lecture 10 - Rings, Integral Domains and Fields - Part A

Lecture 11 - Rings, Integral Domains and Fields - Part B

Lecture 12 - Rings, Integral Domains and Fields - Part C

Lecture 13 - Vector Spaces and Subspaces - Part A

Lecture 14 - Vector Spaces and Subspaces - Part B

Lecture 15 - Vector Spaces and Subspaces - Part C

Lecture 16 - Unions, Intersection, Sums of Subspaces - Part A

Lecture 17 - Unions, Intersection, Sums of Subspaces - Part B

Lecture 18 - Generating sets, Linear independence and basis - Part A

Lecture 19 - Generating sets, Linear independence and basis - Part B

Lecture 20 - Generating sets, Linear independence and basis - Part C

Lecture 21 - Ordered basis and co-ordinates - Part A

Lecture 22 - Ordered basis and co-ordinates - Part B

Lecture 23 - Ordered basis and co-ordinates - Part C

Lecture 24 - Rank-Nullity Theorem (Matrices) - Part A

Lecture 25 - Rank-Nullity Theorem (Matrices) - Part B

Lecture 26 - Rank-Nullity Theorem (Matrices) - Part C

Lecture 27 - Rank-Nullity Theorem (Linear Transformation) - Part A

Lecture 28 - Rank-Nullity Theorem (Linear Transformation) - Part B

Lecture 29 - Rank-Nullity Theorem (Linear Transformation) - Part C

Lecture 30 - Isomorphism and Inverses - Part A

Lecture 31 - Isomorphism and Inverses - Part B

NPTEL : NOC:Digital Communication using GNU Radio (Electrical Engineering)

Co-ordinators : Prof. Kumar Appaiah

NPTEL : Circuit Theory (Electrical Engineering)

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

Lecture 1 - Review of Signals and Systems

Lecture 2 - Review of Signals and Systems

Lecture 3 - Network Equations; Initial and Final Conditions

Lecture 4 - Problem Session 1

Lecture 5 - Step, Impulse and Complete Responses

Lecture 6 - 2nd Order Circuits:Magnetically Coupled Circuits

Lecture 7 - Transformer Transform Domain Analysis

Lecture 8 - Problem Session 2 : Step,Impulse

Lecture 9 - Network Theorems and Network Functions

Lecture 10 - Network Functions (Continued.)

Lecture 11 - Amplitude and Phase of Network Functions

Lecture 12 - Problem Session 3 : Network Theorems Transform

Lecture 13 - Poles, Zeros and Network Response

Lecture 14 - Single Tuned Circuits

Lecture 15 - Single Tuned Circuits (Continued.)

Lecture 16 - Double Tuned Circuits

Lecture 17 - Double Tuned Circuits (Continued.)

Lecture 18 - Problem Session 4 : Network Functions, Analysis

Lecture 19 - Double Tuned Circuits (Continued.)

Lecture 20 - Concept of Delay and Introduction

Lecture 21 - Two-port Networks (Continued.)

Lecture 22 - Problem Session 5

Lecture 23 - Minor - 1

Lecture 24 - The Hybrid & Transmission Parameters of 2 ports

Lecture 25 - Problem Session 6 : Two - port networks

Lecture 26 - Two - port Network parameters

Lecture 27 - Two-port Interconnections

Lecture 28 - Interconnection of Two-port Networks (Continued.)

Lecture 29 - Problem Session 7 : Two-port Networks (Continued.)

Lecture 30 - Scattering Matrix

Lecture 31 - Scattering Parameters of a Two-port

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

Lecture 32 - Direct Method of Transient Stability Analysis - Part-2

Lecture 33 - Sub Synchronous Oscillations - Part-1

Lecture 34 - Sub Synchronous Oscillations - Part-2

Lecture 35 - Voltage Stability - Part-1

Lecture 36 - Voltage Stability - Part-2

Lecture 37 - Voltage Stability - Part-3

Lecture 38 - Voltage Stability - Part-4

Lecture 39 - Methods of Improving Stability - Part-1

Lecture 40 - Methods of Improving Stability - Part-2

NPTEL : Analog Electronic Circuits (Electrical Engineering)

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

Lecture 32 - Analysis of the Series - Series and Other Feedback Configurations

Lecture 33 - Problem Session-8 on Feedback Amplifiers

Lecture 34 - Sinusoidal Oscillators : An Example of Positive Feedback

Lecture 35 - More on Oscillators

Lecture 36 - Solutions to Minor-2 Exam and Concluding Discussions on Oscillators

Lecture 37 - Problem Session-9 on Oscillators

Lecture 38 - Tuned (or Narrowband) Amplifiers

Lecture 39 - Widebanding Techniques : Introduction & Use of Inductors

Lecture 40 - Widebanding By Using an Inductance

Lecture 41 - Problem Session-10 on Tuned Amplifiers

Lecture 42 - Widebanding by Using Compound Devices

Lecture 43 - Cascode Configuration as Wideband Amplifier

Lecture 44 - Widebanding by Local Feedback

Lecture 45 - Problem Session-11 on Minor-3 Problems & Widebanding by Compound Devices

Lecture 46 - Widebanding by Local Feedback and Feedback Cascades

Lecture 47 - Widebanding by Overall Feedback and Dual Loop Feedback

Lecture 48 - The Differential Pair and the Gilbert Cell as Wideband Amplifiers

Lecture 49 - Correction to Gilbert Cell Analysis and Operational Amplifier Imperfections

Lecture 50 - Op-Amp offsets, Compensation and Slew Rate

Lecture 51 - Op-Amp Compensation, Slew Rate and Some Problems

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

Lecture 32 - Simulation Studies on Open Loop Induction Motor Drive

NPTEL : NOC:Power Electronics (Electrical Engineering)

Co-ordinators : Prof. G.Bhuvaneshwari

NPTEL : NOC:Electrical Machines (Electrical Engineering)

Co-ordinators : Prof. G.Bhuvaneshwari

Lecture 32 - Testing of Induction Motor: OC and SC Test

Lecture 33 - 3 Phase Induction Machine: Starting Methods

Lecture 34 - Synchronous Machines: Introduction

Lecture 35 - Synchronous Machines: Constructional Features

Lecture 36 - Numerical Session

Lecture 37 - Synchronization of Alternators

Lecture 38 - Synchronous Machines: Equivalent Circuit and Phasor Diagram

Lecture 39 - Synchronous Machines: OC and SC Test

Lecture 40 - Synchronous Machines: Power Angle Relationship, V and Inverted V Curves

Lecture 41 - Single Phase Induction Motors

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

Lecture 32 - ADC and DAC using R2R Ladder and Random number generation using LFSR

Lecture 33 - Serial Communication Protocols, USCI Module in MSP430

Lecture 34 - MSP430 Timer in Capture Mode

Lecture 35 - Coding Ninja

Lecture 36 - Building an Electronics Project

Lecture 37 - Circuit Prototyping Techniques

Lecture 38 - Single Purpose Computers

Lecture 39 - Single Purpose Computers (Continued...)

Lecture 40 - Recap of Course Coverage and Project Demonstration from Concept to Final

NPTEL : NOC:Power Quality (Electrical Engineering)

Co-ordinators : Prof. Bhim Singh

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

Co-ordinators : Prof. Bhim Singh

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

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

NPTEL : NOC:Transducers for Instrumentation (Electrical Engineering)

Co-ordinators : Ankur Gupta

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

NPTEL : NOC:Computer-Aided Design of Electrical Machines (Electrical Engineering)

Co-ordinators : Prof. Bhim Singh

Lecture 32 - Design of Switched Reluctance Machines - II

Lecture 33 - Design of Switched Reluctance Machines - III

Lecture 34 - Design of Stepper Machines - I

Lecture 35 - Design of Stepper Machines - II

Lecture 36 - Design of Axial Flux Machines - I

Lecture 37 - Design of Axial Flux Machines - II

Lecture 38 - Computer Aided Design and Analysis Method - I

Lecture 39 - Computer Aided Design and Analysis Method - II

Lecture 40 - Case Studies and Tutorials - I and II

Lecture 41 - Tutorial-III : Determination of Transformer Operating Point

Lecture 42 - Tutorial-IV

NPTEL : NOC:Electronic Systems Design: Hands-on Circuits and PCB Design with CAD Software (Electrical Engineering)

Co-ordinators : Prof. 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

Lecture 1 - Microprocessor Operations

Lecture 2 - 8086 Flags

Lecture 3 - Functional Diagram of 8086

Lecture 4 - 8086 Common and Minimum Mode Signals

Lecture 5 - 8086 Maximum Mode Signals

Lecture 6 - 8086 Data Transfer Instructions

Lecture 7 - 8086 Arithmetic Instructions - I

Lecture 8 - 8086 Arithmetic Instructions - II

Lecture 9 - 8086 Logical Instructions

Lecture 10 - 8086 Branch and String Instructions

Lecture 11 - 8086 Interrupt and Machine Control Instructions

Lecture 12 - Sum of Products, Multi-byte addition

Lecture 13 - Largest number, 2's complement Programs

Lecture 14 - Programs on Subroutines

Lecture 15 - ROM, RAM

Lecture 16 - Example I

Lecture 17 - Example II

Lecture 18 - Architecture, Interfacing to Simple I/O

Lecture 19 - Keyboard Interface

Lecture 20 - 7-segment Display Interface

Lecture 21 - Multiplexed 7-sgment Display Interface

Lecture 22 - Stepper motor, Liquid level control

Lecture 23 - Traffic light control, A/D converter

Lecture 24 - D/A converter

Lecture 25 - Electronic weighing machine

Lecture 26 - Programable Interval Timer (8254)

Lecture 27 - Modes of 8254

Lecture 28 - Architecture of 8259

Lecture 29 - Initialization command words of 8259

Lecture 30 - Operational command words of 8259

Lecture 31 - 8237 Architecture, interfacing and Programming

NPTEL : NOC:Statistical Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Prabin Kumar Bora

Lecture 1 - Overview of Statistical Signal Processing

Lecture 2 - Probability and Random Variables

Lecture 3 - Linear Algebra of Random Variables

Lecture 4 - Random Processes

Lecture 5 - Linear Shift Invariant Systems with Random Inputs

Lecture 6 - White Noise and Spectral Factorization Theorem

Lecture 7 - Linear Models of Random Signals

Lecture 8 - Estimation Theory - 1

Lecture 9 - Estimation Theory - 2: MVUE and Cramer Rao Lower Bound

Lecture 10 - Cramer Rao Lower Bound 2

Lecture 11 - MVUE through Sufficient Statistic - 1

Lecture 12 - MVUE through Sufficient Statistic - 2

Lecture 13 - Method of Moments and Maximum Likelihood Estimators

Lecture 14 - Properties of Maximum Likelihood Estimator (MLE)

Lecture 15 - Bayesian Estimators - 1

Lecture 16 - Bayesian Estimators - 2

Lecture 17 - Optimal linear filters: Wiener Filter

Lecture 18 - FIR Wiener filter

Lecture 19 - Non-Causual IIR Wiener Filter

Lecture 20 - Causal IIR Wiener Filter

Lecture 21 - Linear Prediction of Signals - 1

Lecture 22 - Linear Prediction of Signals - 2

Lecture 23 - Linear Prediction of Signals - 3

Lecture 24 - Review Assignment - 1

Lecture 25 - Adaptive Filters - 1

Lecture 26 - Adaptive Filters - 2

Lecture 27 - Adaptive Filters - 3

Lecture 28 - Review Assignment - 2

Lecture 29 - Adaptive Filters - 4

Lecture 30 - Adaptive Filters - 4 (Continued...)

Lecture 31 - Review Assignment - 3

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

Lecture 32 - Conceptualization and Prototyping - I (B)

Lecture 33 - Conceptualization and Prototyping - I (C)

Lecture 34 - Conceptualization and Prototyping - II (A)

Lecture 35 - Conceptualization and Prototyping - II (B)

Lecture 36 - Usability heuristics and testing - I

Lecture 37 - Usability heuristics and testing - II

Lecture 38 - Usability heuristics and testing - III

Lecture 39 - Usability Testing (A)

Lecture 40 - Usability Testing (B)

Lecture 41 - Usability Testing (C)

Lecture 42 - UI/UX design based on Garret model: a case study

Lecture 43 - Effective contextual enquiry

Lecture 44 - Contextual enquiry: case study

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

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

Co-ordinators : Prof. M.K. Bhuyan

NPTEL : NOC:Integrated Circuits and Applications (Electrical Engineering)

Co-ordinators : Prof. Shaik Rafi Ahamed

NPTEL : NOC:Photonic Crystals: Fundamentals and Applications (Electrical Engineering)

Co-ordinators : Prof. Debabrata Sikdar

NPTEL : Advanced Electric Drives (Electrical Engineering)

Co-ordinators : Dr. S.P. Das

Lecture 1

Lecture 2

Lecture 3

Lecture 4

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Lecture 6

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Lecture 9

Lecture 10

Lecture 11

Lecture 12

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Lecture 14

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Lecture 23

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Lecture 25

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Lecture 28

Lecture 29

Lecture 30

Lecture 31

NPTEL : High Voltage DC Transmission (Electrical Engineering)

Co-ordinators : Dr. S.N. Singh

Lecture 1 - High Voltage DC Transmission

Lecture 2 - High Voltage DC Transmission

Lecture 3 - High Voltage DC Transmission

Lecture 4 - High Voltage DC Transmission

Lecture 5 - High Voltage DC Transmission

Lecture 6 - High Voltage DC Transmission

Lecture 7 - High Voltage DC Transmission

Lecture 8 - High Voltage DC Transmission

Lecture 9 - High Voltage DC Transmission

Lecture 10 - High Voltage DC Transmission

Lecture 11 - High Voltage DC Transmission

Lecture 12 - High Voltage DC Transmission

Lecture 13 - High Voltage DC Transmission

Lecture 14 - High Voltage DC Transmission

Lecture 15 - High Voltage DC Transmission

Lecture 16 - High Voltage DC Transmission

Lecture 17 - High Voltage DC Transmission

Lecture 18 - High Voltage DC Transmission

Lecture 19 - High Voltage DC Transmission

Lecture 20 - High Voltage DC Transmission

Lecture 21 - High Voltage DC Transmission

Lecture 22 - High Voltage DC Transmission

Lecture 23 - High Voltage DC Transmission

Lecture 24 - High Voltage DC Transmission

Lecture 25 - High Voltage DC Transmission

Lecture 26 - High Voltage DC Transmission

Lecture 27 - High Voltage DC Transmission

Lecture 28 - High Voltage DC Transmission

Lecture 29 - High Voltage DC Transmission

Lecture 30 - High Voltage DC Transmission

Lecture 31 - High Voltage DC Transmission

Lecture 32 - High Voltage DC Transmission

Lecture 33 - High Voltage DC Transmission

Lecture 34 - High Voltage DC Transmission

Lecture 35 - High Voltage DC Transmission

Lecture 36 - High Voltage DC Transmission

Lecture 37 - High Voltage DC Transmission

NPTEL : Intelligent Systems and Control (Electrical Engineering)

Co-ordinators : Prof. Laxmidhar Behera

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

Lecture 32 - Solution of LaplaceÂ's equation-IV

Lecture 33 - Introduction of magnetic field

Lecture 34 - Biot savart law and its application

Lecture 35 - Biot savart lawandits application-II

Lecture 36 - Magnetic vector potential

Lecture 37 - Magnetic force, torque and dipole

Lecture 38 - Magnetic force, torque and dipole (Continued...)

Lecture 39 - Magnetic materials-I

Lecture 40 - Magnetic materials-I (Continued...) and Magnetic moment

Lecture 41 - Magnetic materials-I (Continued...) and Boundary condition for Magnetic fields

Lecture 42 - Inductor and calculation of inductance for different shapes

Lecture 43 - Inductor and calculation of inductance for different shapes (Continued...)

Lecture 44 - Faradays law and its application-I

Lecture 45 - Faradays law and its application-II

Lecture 46 - Displacement current

Lecture 47 - MaxwellÂ's equation

Lecture 48 - Wave propagation

Lecture 49 - Solution of Helmholtz equation

Lecture 50 - Uniform plane waves

Lecture 51 - Polarization and Poynting Vector

Lecture 52 - Wave reflections (Normal incidence)

Lecture 53 - Waves in imperfect dielectrics and Good conductors

Lecture 54 - Skin depth/effect

Lecture 55 - Oblique incidence of waves

Lecture 56 - Oblique incidence of waves (Continued...)

Lecture 57 - Transmission line

Lecture 58 - Transmission line model

Lecture 59 - Steady state sinusoidal response of T-line-I

Lecture 60 - Steady state sinusoidal response of T-line-II

Lecture 61 - Steady state sinusoidal response of T-line-IIand Smith chart

Lecture 62 - Application of smith chart-I

Lecture 63 - Application of smith chart-II

Lecture 64 - Impedance matching

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

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 31 - Indirect Method for Generation of FM Signals - Generation of Wideband FM Signal through Frequency Multiplication

Lecture 32 - Spectrum of Frequency Modulated (FM) Signals

Lecture 33 - Bandwidth of Frequency Modulated (FM) Signals - Carson's Rule

Lecture 34 - Demodulation of Frequency Modulated (FM) Signals, Condition of Envelope Detection

Lecture 35 - Analog to Digital Conversion of Signals and Introduction to Sampling

Lecture 36 - Spectrum of Sampled Signal, Aliasing and Nyquist Sampling Theorem

Lecture 37 - Ideal Impluse Train Sampling, Reconstruction of Original Signal from Samples, Sinc Interpolation

Lecture 38 - Introduction to Pulse Amplitude Modulation (PAM), Sample and Hold, Flat Top Sampling

Lecture 39 - Pulse Amplitude Modulation (PAM), Spectrum of PAM Signal , Reconstruction of Original Signal from PAM Signal, Equalization

Lecture 40 - Introduction to Quantization, Uniform Quantizer, Mid- Tread Quantizer

Lecture 41 - Quantization, Mid- Rise Quantizer, PDF and Power of Quantization Noise, Quantization Noise Power versus Quantizer Resolution

Lecture 42 - Introduction to Lloyd- Max Quantization Algorithm, Optimal Quantizer Design

Lecture 43 - Lloyd- Max Quantization Algorithm, Iterative Computation of Optimal Quantization Levels and Intervals

Lecture 44 - Companding for Non- Uniform Quantization, Mu-law Compressor, A- Law Compressor

Lecture 45 - Introduction to Delta Modulation, One-bit Quantizer

Lecture 46 - Signal Reconstruction in Delta Modulation, Schematic Diagrams, Slope Overload Distortion and Granular Noise

Lecture 47 - Differential Pulse Coded Modulation (DPCM), DPCM Signal Reconstruction and Schematic Diagram

Lecture 48 - Frequency Mixing and Translation in Communication Systems, Heterodyne and Super Heterodyne Receivers

Lecture 49 - Frequency Translation and Super Heterodyne Receivers, Problem of Image Frequency

Lecture 50 - Frequency Division Multiplexing (FDM), Carrier Spacing in FDM

Lecture 51 - Time Division Multiplexing (TDM), Operation of TDM, Sample Spacing in TDM

Lecture 52 - Bandwidth Requirements for Time Division Multiplexing (TDM), The T1 TDM System : A Case Study

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

Co-ordinators : Dr. Adrish Banerjee

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: Reed Muller Codes

Lecture 13 - Bounds on the Size of a Code

Lecture 14 - Problem Solving Session - III

Lecture 15 - Introduction to Convolutional Codes - I: Encoding

Lecture 16 - Introduction to Convolutional Codes - II: State Diagram, Trellis Diagram

Lecture 17 - Convolutional Codes: Classification, Realization

Lecture 18 - Convolutional Codes:Distance Properties

Lecture 19 - Decoding of Convolutional Codes - I: Viterbi Algorithm

Lecture 20 - Decoding of Convolutional Codes - II: BCJR Algorithm

Lecture 21 - Problem solving session - IV

Lecture 22 - Problem solving session - V

Lecture 23 - Performance Bounds for Convolutional Codes

Lecture 24 - Low Density Parity Check Codes

Lecture 25 - Decoding of Low Density Parity Check Codes - I

Lecture 26 - Decoding of Low Density Parity Check Codes - II: Belief Propagation Algorithm

Lecture 27 - Turbo Codes

Lecture 28 - Turbo Decoding

Lecture 29 - Problem Solving Sessions - VI

Lecture 30 - Distance Properties of Turbo Codes

Lecture 31 - Convergence of Turbo Codes

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

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 29 - Maximum Entropy of Source with M-ary Alphabet, Concave/Convex Functions and Jensens Inequality

Lecture 30 - Joint Entropy , Definition of Joint Entropy of Two Sources and Simple Examples for Joint Entropy Computation

Lecture 31 - Properties of Joint Entropy and Relation between Joint Entropy and Marginal Entropies

Lecture 32 - Conditional Entropy, Example of Conditional Entropy and Properties of Conditional Entropy

Lecture 33 - Mutual Information, Diagrammatic Representation and Properties of Mutual Information

Lecture 34 - Simple Example of Mutual Information and Practical Example of Mutual Information-Binary Symmetric Channel

Lecture 35 - Channel Capacity, Implications of Channel Capacity, Claude E. Shannon- Father of Information Theory and Example of Capacity of Binary Symmetric Channel

Lecture 36 - Differential Entropy and Example for Uniform Probability Density function

Lecture 37 - Differential Entropy of Gaussian Source and Insights

Lecture 38 - Joint Conditional/ Differential Entropies and Mutual Information

Lecture 39 - Capacity of Gaussian channel - Part I

Lecture 40 - Capacity of Gaussian Channel - Part-II, Practical Implications and Maximum rate in bits\sec

Lecture 41 - Introduction to Source Coding and Data Compression, Variable Length codes and Unique Decodability

Lecture 42 - Uniquely Decodable Codes, Prefix-free code, Instantaneous Code and Average Code length

Lecture 43 - Binary Tree Representation of Code, Example and Kraft Inequality

Lecture 44 - Lower Bound on Average Code Length and Kullback-Leibler Divergence

Lecture 45 - Optimal Code length, Constrained Optimization and Morse Code Example

Lecture 46 - Approaching Lower Bound on Average code length and Block Coding

Lecture 47 - Huffman Code, Algorithm, Example and Average Code Length

Lecture 48 - Introduction to channel coding, Rate of Code, Repetition Code and Hamming Distance

Lecture 49 - Introduction to Convolutional Codes, Binary Field Arithmetic and Linear Codes

Lecture 50 - Example of Convolutional Code Output and Convolution Operation for Code generation

Lecture 51 - Matrix Representation of Convolutional Codes, Generator Matrix, Transform Domain Representation and Shift Register Architecture

Lecture 52 - State Diagram Representation of Convolutional Code, State transitions and Example of Code Generation using State transitions

Lecture 53 - Trellis Representation of Convolutional Code and Valid Code Words

Lecture 54 - Decoding of the Convolutional Code, Minimum Hamming distance and Maximum Likelihood Codeword Estimate

Lecture 55 - Principle of Decoding of Convolutional code

Lecture 56 - Viterbi Decoder for Maximum Likelihood Decoding of Convolutional Code Using Trellis Representation, Branch Metric Calculation, State Metric Calculation and Example

NPTEL : NOC:Applied Engineering Electromagnetics (Electrical Engineering)

Co-ordinators : Dr. Pradeep Kumar K

Lecture 1 - Introduction to Applied Elecromagnetics

Lecture 2 - Introduction to Transmission lines

Lecture 3 - Sinusoidal waves on Transmission lines

Lecture 4 - Terminating T-lines: Reflection and Transmission coefficient

Lecture 5 - Circuit parameters of a T-line

Lecture 6 - Lossy Transmission lines and primary constants

Lecture 7 - When to apply T-line Theory?

Lecture 8 - Standing Waves on T-lines

Lecture 9 - Lumped equivalent circuits of T-lines

Lecture 10 - Impedance transformation and power flow on T-lines

Lecture 11 - Graphical aid: Smith Chart Derivation

Lecture 12 - Smith chart applications

Lecture 13 - Further applications of Smith chart - Part 1

Lecture 14 - Further applications of Smith chart - Part 2

Lecture 15 - Impedance matching techniques - Part 1

Lecture 16 - Impedance matching techniques - Part 2

Lecture 17 - Impedance matching techniques - Part 3

Lecture 18 - T-lines in time domain: Lattice diagrams

Lecture 19 - Further examples of use of lattice diagrams

Lecture 20 - High-speed digital signal propagation on T-lines

Lecture 21 - Transient analysis with reactive termination and Time-domain reflectometry

Lecture 22 - Fault detection using TDR

Lecture 23 - Why Electromagnetics?

Lecture 24 - Rectangular coordinate systems

Lecture 25 - Cylindrical coordinate systems

Lecture 26 - Review of vector fields and Gradient

Lecture 27 - Divergence, Curl, and Laplacian operations

Lecture 28 - Towards Maxwells equations - Part 1

Lecture 29 - Towards Maxwells equations - Part 2

Lecture 30 - Faradays law

Lecture 31 - Completing Maxwells equations and Boundary conditions

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

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

Co-ordinators : Dr. Pradeep Kumar K

Lecture 1 - Overview of fiber-optic communication systems

Lecture 2 - Review of Maxwellâ€™s equations

Lecture 3 - Uniform plane waves (UWPs) in free-space

Lecture 4 - Properties of UWPs (propagation constant, polarization, and Poynting vector)

Lecture 5 - Boundary conditions and reflection from a PEC

Lecture 6 - Obliquely incident waves-I (TE and TM waves, Snellâ€™s laws)

Lecture 7 - Obliquely incident waves-II (Reflection and transmission coefficients, Brewster angle)

Lecture 8 - Total internal reflection

Lecture 9 - Ray theory of dielectric slab waveguides

Lecture 10 - Transverse resonance condition for slab waveguides

Lecture 11 - Introduction to optical fibers

Lecture 12 - Ray theory of light propagation in optical fibers

Lecture 13 - Concept of waveguide modes

Lecture 14 - Systematic procedure to obtain modes of a waveguide

Lecture 15 - Systematic analysis of parallel plate metallic waveguide

Lecture 16 - Systematic analysis of dielectric slab waveguides

Lecture 17 - Further discussion on slab waveguides

Lecture 18 - Modal analysis of step index optical fiber

Lecture 19 - Properties of modes of step-index optical fiber - I

Lecture 20 - Properties of modes of step-index optical fiber - II

Lecture 21 - Linearly polarized modes

Lecture 22 - Attenuation and power loss in fibers

Lecture 23 - Introduction to dispersion in fibers

Lecture 24 - Mathematical modelling of dispersion: Transfer function approach

Lecture 25 - Pulse propagation equation and its solution

Lecture 26 - Pre-chirped pulses and Inter and Intra-modal dispersion in optical fibers

Lecture 27 - Beam Propagation Method

Lecture 28 - Polarization Effects on Pulse Propagation

Lecture 29 - Modes in Optical Fibres and Pulse Propagation in Optical Fibres

Lecture 30 - Graded Index Fibers

Lecture 31 - Light Sources, Detectors and Amplifiers

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

Lecture 32 - Transfer Function

Lecture 33 - Convolution Integral

Lecture 34 - Graphical Approach of Convolution Integral

Lecture 35 - Network Stability and Network Synthesis

Lecture 36 - Impedance Parameters

Lecture 37 - Admittance Parameters

Lecture 38 - Hybrid Parameters

Lecture 39 - Transmission Parameters

Lecture 40 - Interconnection of Networks

Lecture 41 - Nodal and Mesh Analysis

Lecture 42 - Superposition Theorem and Source Transformation

Lecture 43 - Thevenin's, Norton's and, Maximum Power Transfer Theorem

Lecture 44 - Magnetically Coupled Circuits

Lecture 45 - Energy in Coupled Circuits and Ideal Transformer

Lecture 46 - Ideal Transformer and Introduction to Three-Phase Circuits

Lecture 47 - Balanced Three-Phase Connections

Lecture 48 - Balanced Wye-Delta and Delta-Delta Connections

Lecture 49 - Balanced Delta-Wye Connection and Power in Balanced Three-Phase System

Lecture 50 - Unbalanced Three-Phase System and Three-Phase Power Measurement

Lecture 51 - Introduction to Graphical Models

Lecture 52 - State Equations

Lecture 53 - State Diagram

Lecture 54 - State Transition Matrix

Lecture 55 - State Variable Method to Circuit Analysis

Lecture 56 - Characteristic Equation, Eigenvalues, and Eigenvectors-State Variable Analysis (Continued...)

Lecture 57 - Modeling of Mechanical Systems

Lecture 58 - Modeling of The Rotational Motion of Mechanical Systems

Lecture 59 - Modeling of Electrical Systems

Lecture 60 - Solving Analogous Systems

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

Co-ordinators : Prof. Shyama Prasad Das

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 32

Lecture 33

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Lecture 65

NPTEL : Electrical Machines I (Electrical Engineering)

Co-ordinators : Dr. D. Kastha

Lecture 32 - Speed Control of DC Shunt Motors

Lecture 33 - Braking of DC Shunt Motors

Lecture 34 - Electronic Control of DC Shunt Motors

Lecture 35 - Testing of DC Shunt Motors

Lecture 36 - Characteristics of DC Series Motors

Lecture 37 - Starting and Braking of DC Series Motors

Lecture 38 - Speed Control and of DC Series Motors

Lecture 39 - Testing of DC Series Motors

Lecture 40 - Characteristics of Compound DC Series Motors

NPTEL : Optimal Control (Electrical Engineering)

Co-ordinators : Prof. G.D. Ray

Lecture 1 - Introduction to Optimization Problem: Some Examples

Lecture 2 - Introduction to Optimization Problem: Some Examples (Continued.)

Lecture 3 - Optimality Conditions for Function of Several Variables

Lecture 4 - Optimality Conditions for Function of Several Variables (Continued.)

Lecture 5 - Unconstrained Optimization Problem (Numerical Techniques)

Lecture 6 - Solution of Unconstrained Optimization Problem Using Conjugate Quadient Method and Networks Methods

Lecture 7 - Solution of Unconstrained Optimization Problem Using Conjugate Quadient Method and Networks Methods (Continued.)

Lecture 8 - Solution of Constraint Optimization Problem-Karush-Kuhn Tucker (KKT) Conditions

Lecture 9 - Solution of Constraint Optimization Problem-Karush-Kuhn Tucker (KKT) Conditions (Continued.)

Lecture 10 - Problem and Solution Session

Lecture 11 - Post Optimality Analysis, Convex Function and its Properties

Lecture 12 - Post Optimality Analysis, Convex Function and its Properties (Continued.)

Lecture 13 - Quadratic Optimization Problem Using Linear Programming

Lecture 14 - Matrix form of the Simplex Method

Lecture 15 - Matrix form of the Simplex Method (Continued.)

Lecture 16 - Solution of Linear Programming Using Simplex Method:- Algebraic Approach

Lecture 17 - Solution of Linear Programming Using Simplex Method:- Algebraic Approach (Continued.)

Lecture 18 - Solution of LP Problems with Two Phase Method

Lecture 19 - Solution of LP Problems with Two Phase Method (Continued.)

Lecture 20 - Standard Primal and Dual Problems

Lecture 21 - Relationship Between Primal and Dual Variables

Lecture 22 - Solution of Quadratic Programming Problem Using Simplex Method

Lecture 23 - Interior Point Method for Solving Optimization Problems

Lecture 24 - Interior Point Method for Solving Optimization Problems (Continued.)

Lecture 25 - Solution of Nonlinear Programming Problem Using Exterior Penalty Function Method

Lecture 26 - Solution of Nonlinear Programming Problem Using Exterior Penalty Function Method (Continued.)

Lecture 27 - Solution of Nonlinear Programming Problem Using Interior Penalty Function Method

Lecture 28 - Solution of Nonlinear Programming Problem Using Interior Penalty Function Method (Continued.)

Lecture 29 - Multiobjective Optimization Problem

Lecture 30 - Dynamic Optimization Problem: Basic Concepts and Necessary and Sufficient Condition

Lecture 31 - Dynamic Optimization Problem: Basic Concepts and Necessary and Sufficient Condition (Continued...1)

Lecture 32 - Dynamic Optimization Problem: Basic Concepts and Necessary and Sufficient Condition (Continued...2)

Lecture 33 - Numerical Example and Solution of Optimal Control Problem using Calculus of Variation principle

Lecture 34 - Numerical Example and Solution of Optimal Control Problem using Calculus of Variation principle (Continued.)

Lecture 35 - Hamiltonian Formulation for solution of optimal Control problem and numerical example

Lecture 36 - Hamiltonian Formulation for solution of optimal Control problem and numerical example (Continued.)

Lecture 37 - Performance Indices and Linear Quadratic Regulator Problem

Lecture 38 - Performance Indices and Linear Quadratic Regulator Problem (Continued.)

Lecture 39 - Solution and Stability Analysis of Finite - time LQR Problem: Numerical Example

Lecture 40 - Solution and Infinite - time LQR Problem and Stability Analysis

Lecture 41 - Numerical Example and Methods for Solution of A.R.E.

Lecture 42 - Numerical Example and Methods for Solution of A.R.E. (Continued.)

Lecture 43 - Frequency Domain Interpretation of LQR Controlled System

Lecture 44 - Gain and Phase Margin of LQR Controlled System

Lecture 45 - The Linear Quadratic Gaussian Problem

Lecture 46 - Loop-Transfer Recovery

Lecture 47 - Dynamic Programming for Discrete Time Systems

Lecture 48 - Minimum â€“ Time Control of a Linear Time Invariant System

Lecture 49 - Solution of Minimum â€“ Time Control Problem with an Example

Lecture 50 - Constraint in Control Inputs and State Variables

Lecture 51 - Constraint in Control Inputs and State Variables (Continued...)

Lecture 52 - Norms for Vectors, Matrices, Signals and Linear Systems

Lecture 53 - Signal and System Norms

Lecture 54 - Internal Stability, Sensitivity and Complementary Sensitivity Functions

Lecture 55 - Internal Stability, Sensitivity and Complementary Sensitivity Functions (Continued...)

Lecture 56 - Plant Uncertainty and Standard form for Robust Stability Analysis

Lecture 57 - Plant Uncertainty and Standard form for Robust Stability Analysis (Continued...)

Lecture 58 - Frequency Response of Linear System and Singular Value Decomposition of System

Lecture 59 - Control Problem Statement in H- alpha Framework

Lecture 60 - Control Problem Statement in H - alpha Framework (Continued...)

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

Lecture 1 - Introduction to System Elements

Lecture 2 - Newton's Method and Constraints

Lecture 3 - Derivation of the Lagrangian Equation

Lecture 4 - Using the lagrangian Equation to Obtain Differential Equations (Part-I)

Lecture 5 - Using the lagrangian Equation to Obtain Differential Equations (Part-II)

Lecture 6 - Using the lagrangian Equation to Obtain Differential Equations (Part-III)

Lecture 7 - Using the lagrangian Equation to Obtain Differential Equations (Part-IV)

Lecture 8 - Obtaining First Order Equations

Lecture 9 - Application of the Hamiltonian Method

Lecture 10 - Obtaining Differential Equations Using Kirchoff's Laws

Lecture 11 - The Graph Theory Approach for Electrical Circuits (Part-I)

Lecture 12 - The Graph Theory Approach for Electrical Circuits (Part-II)

Lecture 13 - The Bond Graph Approach - I

Lecture 14 - The Bond Graph Approach - II

Lecture 15 - The Bond Graph Approach - III

Lecture 16 - The Bond Graph Approach - IV

Lecture 17 - The Bond Graph Approach - V

Lecture 18 - The Bond Graph Approach - VI

Lecture 19 - The Bond Graph Approach - VII

Lecture 20 - Numerical Solution of Differential Equations

Lecture 21 - Dynamics in the State Space

Lecture 22 - Vector Field Around Equilibrium Points - I

Lecture 23 - Vector Field Around Equilibrium Points - II

Lecture 24 - Vector Field Around Equilibrium Points - III

Lecture 25 - Vector Field Around Equilibrium Points - IV

Lecture 26 - High Dimensional Linear Systems

Lecture 27 - Linear Systems with External Input - I

Lecture 28 - Linear Systems with External Input - II

Lecture 29 - Linear Systems with External Input - III

Lecture 30 - Dynamics of Nonlinear Systems - I

Lecture 31 - Dynamics of Nonlinear Systems - II

NPTEL : Energy Resources and Technology (Electrical Engineering)

Co-ordinators : Prof. S. Banerjee

Lecture 1 - Thermodynamics: Fundamentals Of Energy - Energy Resources & Technology

Lecture 2 - Quality of Energy

Lecture 3 - Complete Cycle Analysis of Fossil Fuels

Lecture 4 - Energy in Transportation

Lecture 5 - Other Fossil Fuels

Lecture 6 - Energy Economics : Input-Output Analysis

Lecture 7 - Energy Economics : Input-Output Analysis

Lecture 8 - Thermal Power Plants

Lecture 9 - Thermal Power Plants

Lecture 10 - Hydroelectric Power

Lecture 11 - Hydroelectric Power

Lecture 12 - Nuclear Power Generation

Lecture 13 - Nuclear Fusion Reactors

Lecture 14 - Environmental Effects of Conventional Power

Lecture 15 - Solar Thermal Energy Conversion

Lecture 16 - Solar Concentrating Collectors

Lecture 17 - Photovoltaic Power Generation

Lecture 18 - Photovoltaic Power Generation (Continued.)

Lecture 19 - Photovoltaic Power Generation (Continued.)

Lecture 20 - Photovoltaic Power Generation (Continued.)

Lecture 21 - Wind Energy - I

Lecture 22 - Wind Energy - II

Lecture 23 - Wind Energy - III

Lecture 24 - Wind Energy - IV

Lecture 25 - Wind Energy - V

Lecture 26 - Wind Energy - VI

Lecture 27 - Wind Electrical Conversion - I

Lecture 28 - Wind Electrical Conversion - II

Lecture 29 - Wind Electrical Conversion - III

Lecture 30 - Tidal Energy

Lecture 31 - Tidal Energy

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

Lecture 1 - Introduction to Power system analysis

Lecture 2 - Introduction to Single Line Diagram

Lecture 3 - Transmission Line Parameters

Lecture 4 - Inductance Calculation (Three Phase)

Lecture 5 - Transmission Line Capacitance

Lecture 6 - Transmission Line Capacitance (Continued..)

Lecture 7 - Transmission Line Modeling

Lecture 8 - Transmission Line Modeling Long Line

Lecture 9 - Transmission Line Steady State Operation

Lecture 10 - Transmission Line Steady State Control Voltage

Lecture 11 - Transmission System A Review

Lecture 12 - Transformer Model

Lecture 13 - Synchronous Machine Model

Lecture 14 - Synchronous Machine Model

Lecture 15 - Load Model

Lecture 16 - Power Flow - I

Lecture 17 - Power Flow - II

Lecture 18 - Power Flow - III

Lecture 19 - Power Flow - IV

Lecture 20 - Power Flow - V

Lecture 21 - Power Flow - VI

Lecture 22 - Power Flow - VII

Lecture 23 - Review of Power System Component Models

Lecture 24 - Review of Power Flow Study

Lecture 25 - Short Circuit Analysis

Lecture 26 - Symmetrical Component Analysis

Lecture 27 - Sequence Networks

Lecture 28 - Unbalanced Fault Analysis

Lecture 29 - Unbalanced Fault Analysis

Lecture 30 - Fault Analysis for Large power Systems

Lecture 31 - Bus Impedance Matrix

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

Lecture 1 - Motivation

Lecture 2 - Preliminaries

Lecture 3 - Biomedical Signal Origin and Dynamics

Lecture 4 - Biomedical Signal Origin and Dynamics (Continued...)

Lecture 5 - Biomedical Signal Origin and Dynamics (Continued...)

Lecture 6 - Biomedical Signal Origin and Dynamics (Continued...)

Lecture 7 - Artifact Removal

Lecture 8 - Artifact Removal (Continued...)

Lecture 9 - Artifact Removal (Continued...)

Lecture 10 - Artifact Removal (Continued...)

Lecture 11 - Artifact Removal (Continued...)

Lecture 12 - Artifact Removal (Continued...)

Lecture 13 - Artifact Removal (Continued...)

Lecture 14 - Artifact Removal (Continued...)

Lecture 15 - Artifact Removal (Continued...)

Lecture 16 - Artifact Removal (Continued...)

Lecture 17 - Artifact Removal (Continued...)

Lecture 18 - Event Detection

Lecture 19 - Event Detection (Continued...)

Lecture 20 - Event Detection (Continued...)

Lecture 21 - Event Detection (Continued...)

Lecture 22 - Event Detection (Continued...)

Lecture 23 - Event Detection (Continued...)

Lecture 24 - Event Detection (Continued...)

Lecture 25 - Homomorphic Processing

Lecture 26 - Homomorphic Processing (Continued...)

Lecture 27 - Waveform Analysis

Lecture 28 - Waveform Analysis (Continued...)

Lecture 29 - Waveform Analysis

Lecture 30 - Waveform Analysis (Continued...)

Lecture 31 - Waveform Analysis (Continued...)

NPTEL : NOC:Microprocessors and Microcontrollers (Electrical Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

Lecture 32 - 8051 Microcontroller (Continued...)

Lecture 33 - 8051 Microcontroller (Continued...)

Lecture 34 - 8051 Microcontroller (Continued...)

Lecture 35 - 8051 Microcontroller (Continued...)

Lecture 36 - 8051 Programming Examples

Lecture 37 - 8051 Programming Examples (Continued...)

Lecture 38 - 8051 Programming Examples (Continued...)

Lecture 39 - 8051 Programming Examples (Continued...)

Lecture 40 - 8051 Programming Examples (Continued...)

Lecture 41 - ARM

Lecture 42 - ARM (Continued...)

Lecture 43 - ARM (Continued...)

Lecture 44 - ARM (Continued...)

Lecture 45 - ARM (Continued...)

Lecture 46 - ARM (Continued...)

Lecture 47 - ARM (Continued...)

Lecture 48 - ARM (Continued...)

Lecture 49 - PIC

Lecture 50 - PIC, AVR

Lecture 51 - AVR (Continued...)

Lecture 52 - AVR (Continued...)

Lecture 53 - Interfacing

Lecture 54 - Interfacing (Continued...)

Lecture 55 - Interfacing (Continued...)

Lecture 56 - Interfacing (Continued...)

Lecture 57 - Interfacing (Continued...)

Lecture 58 - Interfacing (Continued...)

Lecture 59 - 8086

Lecture 60 - 8086 (Continued...)

Lecture 61 - 8086 (Continued...)

Lecture 62 - 8086 (Continued...)

Lecture 63 - 8086 (Continued...)

Lecture 64 - 8087

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

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11 - Cables (Continued...)

Lecture 12 - Transient over voltages and Insulation coordination

Lecture 13 - Transient over voltages and Insulation coordination (Continued...)

Lecture 14 - Transient over voltages and Insulation coordination (Continued...)

Lecture 15 - Transient over voltages and Insulation coordination (Continued...)

Lecture 16 - Transient over voltages and Insulation coordination (Continued...)

Lecture 17 - Transient over voltages and Insulation coordination (Continued...)

Lecture 18 - Transient over voltages and Insulation coordination (Continued...)

Lecture 19 - Transient over voltages and Insulation coordination (Continued...)

Lecture 20 - Corona

Lecture 21 - Corona (Continued...)

Lecture 22 - Corona (Continued...)

Lecture 23 - Corona (Continued...), Sag and Tension Analysis

Lecture 24 - Sag and Tension Analysis (Continued...)

Lecture 25 - Sag and Tension Analysis (Continued...)

Lecture 26 - Sag and Tension Analysis (Continued...)

Lecture 27 - Sag and Tension Analysis (Continued...)

Lecture 28 - Sag and Tension Analysis (Continued...)

Lecture 29 - Load flow of radial distribution networks

Lecture 30 - Load flow of radial distribution networks (Continued...)

Lecture 31 - Load flow of radial distribution networks (Continued...)

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

Co-ordinators : Prof. Debapriya Das

Lecture 32 - First Order Circuits (Continued...)

Lecture 33 - First Order Circuits (Continued...)

Lecture 34 - First Order Circuits (Continued...)

Lecture 35 - First Order Circuits (Continued...)

Lecture 36 - First Order Circuits (Continued...)

Lecture 37 - Single phase AC circuits

Lecture 38 - Single phase AC circuits (Continued...)

Lecture 39 - Single phase AC circuits (Continued...)

Lecture 40 - Single phase AC circuits (Continued...)

Lecture 41 - Single phase AC circuits (Continued...)

Lecture 42 - Single phase AC circuits (Continued...)

Lecture 43 - Single phase AC circuits (Continued...)

Lecture 44 - Resonance and Maximum Power Transfer Theorem

Lecture 45 - Resonance and Maximum Power Transfer Theorem (Continued...)

Lecture 46 - Resonance and Maximum Power Transfer Theorem (Continued...)

Lecture 47 - Three phase circuits

Lecture 48 - Three phase circuits (Continued...)

Lecture 49 - Three phase circuits (Continued...)

Lecture 50 - Three phase circuits (Continued...)

Lecture 51 - Magnetic Circuits

Lecture 52 - Magnetic Circuits (Continued...)

Lecture 53 - Magnetic Circuits (Continued...)

Lecture 54 - Single Phase Transformer

Lecture 55 - Single Phase Transformer (Continued...)

Lecture 56 - Single Phase Transformer (Continued...)

Lecture 57 - Single Phase Transformer (Continued...)

Lecture 58 - Three phase Induction Motors

Lecture 59 - Three phase Induction Motors (Continued...)

Lecture 60 - Three phase Induction Motors (Continued...)

Lecture 61 - Three phase Induction Motors (Continued...)

Lecture 62 - DC Motors

Lecture 63 - DC Motors (Continued...)

Lecture 64 - DC Motors (Continued...)

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

Lecture 32 - Transient stability, Automatic generation control conventional scenario

Lecture 33 - Automatic generation control conventional scenario

Lecture 34 - Automatic generation control conventional scenario

Lecture 35 - Automatic generation control conventional scenario

Lecture 36 - Automatic generation control conventional scenario

Lecture 37 - Automatic generation control conventional scenario

Lecture 38 - Automatic generation control conventional scenario

Lecture 39 - Automatic generation control conventional scenario

Lecture 40 - Automatic generation control conventional scenario

Lecture 41 - AGC in deregulated system

Lecture 42 - AGC in deregulated system (Continued...)

Lecture 43 - AGC in deregulated system (Continued...)

Lecture 44 - AGC in deregulated system (Continued...)

Lecture 45 - AGC in deregulated system (Continued...)

Lecture 46 - AGC in deregulated system (Continued...)

Lecture 47 - AGC in deregulated system (Continued...)

Lecture 48 - AGC in deregulated system (Continued...)

Lecture 49 - AGC in deregulated system, Reactive power and voltage control

Lecture 50 - Reactive power and voltage control

Lecture 51 - Reactive power and voltage control, State extimation in power system

Lecture 52 - State estimation in power system

Lecture 53 - State estimation in power system (Continued...)

Lecture 54 - State estimation in power system (Continued...)

Lecture 55 - State estimation in power system (Continued...)

Lecture 56 - State estimation in power system (Continued...)

Lecture 57 - Hydraulic turbine modelling

Lecture 58 - Hydraulic turbine modelling (Continued...)

Lecture 59 - Subsynchronous oscillation

Lecture 60 - Subsynchronous oscillation, Windup and non windup limits

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

Co-ordinators : Prof. Suvra Sekhar Das

Lecture 32 - Comparison of waveforms

Lecture 33 - Channel models for performance evaluation - Part I

Lecture 34 - Channel models for performance evaluation - Part II

Lecture 35 - Channel models for performance evaluation - Part III

Lecture 36 - MIMO Signal Processing (Receive Diversity)

Lecture 37 - MIMO Signal Processing

Lecture 38 - MIMO Signal Processing (Capacity)

Lecture 39 - MIMO Signal Processing (Capacity and Massive MIMO)

Lecture 40 - Hybrid beamforming (mmWave)

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

Co-ordinators : Prof. Avishek Chatterjee

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

Lecture 1 - Tx- Rx Structure

Lecture 2 - Rx -Structure

Lecture 3 - Fundamental of Ray-Tracing model

Lecture 4 - General channel model - Part I

Lecture 5 - General channel model - Part I (Continued...)

Lecture 6 - General channel model - Part I (Continued...)

Lecture 7 - General channel model - Part II

Lecture 8 - Wireless channel-A ray tracing model - Part II

Lecture 9 - Wireless channel-A ray tracing model - Part II (Continued...)

Lecture 10 - Wireless channel-A ray tracing model - Part II (Continued...)

Lecture 11 - Wireless channel-A ray tracing model - Part II (Continued...)

Lecture 12 - RMS Delay spread and Doppler Effect on channel

Lecture 13 - Time Varing Model

Lecture 14 - Doppler Impact on coherence BW

Lecture 15 - Introduction to time series

Lecture 16 - AR,ARMA,MA process

Lecture 17 - Doppler with AR process model

Lecture 18 - Coherence time and parameter summery

Lecture 19 - Basic ISI channel

Lecture 20 - Channel estimation and Equalizer

Lecture 21 - precoder and MIMO

Lecture 22 - precoder and MIMO (Continued...)

Lecture 23 - Basics of mmwave spectrum

Lecture 24 - Angle of arrival and angle of departure

Lecture 25 - 3D concepts, AoA,AoD

Lecture 26 - mmWave channel model with RX beaming

Lecture 27 - mmWave channel model with RX beaming (Continued...)

Lecture 28 - mmWave channel model with RX beaming (Continued...)

Lecture 29 - mmWave channel model with RX beaming (Continued...)

Lecture 30 - mmwave channel model (Continued...)

Lecture 31 - mmWave channel model (Continued...) -Tx side multiple antenna

Lecture 32 - Basics of Beamforming

Lecture 33 - Single Antenna beamforming

Lecture 34 - Concept of antenna many fold vector

Lecture 35 - 3D Concept of antenna many fold vector

Lecture 36 - Different Geometry of antennafrom electrical point of view

Lecture 37 - Basics of Beamforming pattern - Part I

Lecture 38 - Basics of Beamforming pattern - Part II

Lecture 39 - SISO Beamforming

Lecture 40 - MIMO Beamforming

Lecture 41 - Structural implementation of MIMO Beamforming

Lecture 42 - Different Level of Beamforming

Lecture 43 - MIMO Beamforming in Transmitter side

Lecture 44 - MIMO Beamforming in Receiver side - Part I

Lecture 45 - MIMO Beamforming in Receiver side - Part II

Lecture 46 - Mathematical description of MIMO Beamforming (Continued...)

Lecture 47 - Equalizer based detector

Lecture 48 - Parameter to be designed in MIMO Beamforming

Lecture 49 - OFDM Data Model

Lecture 50 - OFDM Data model (Continued...)

Lecture 51 - General OFDM

Lecture 52 - OFDM spectrum and CFO

Lecture 53 - MIMO OFDM structure

Lecture 54 - MIMO OFDM decode and beamforming

Lecture 55 - Design parameter estimation - Part 1

Lecture 56 - Design parameter estimation - Part 2

Lecture 57 - Design parameter estimation - Part 3

Lecture 58 - Design parameter estimation - Part 4

Lecture 59 - Design parameter estimation - Part 5

Lecture 60 - MU System

Lecture 61 - CFO and other impairment and their effects

Lecture 62 - Multi User Hybrid beam and impairment and analysis - Part 3

Lecture 63 - Multi User Hybrid beam and Impairment and analysis - Part 4

Lecture 64 - Multi User Hybrid beam and Impairment and analysis - Part 5

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

Lecture 1 - Scattering Matrix Concepts

Lecture 2 - Scattering Matrix Concepts (Continued...)

Lecture 3 - Scattering Matrix Concepts (Continued...)

Lecture 4 - Scattering Matrix Concepts (Continued...)

Lecture 5 - Scattering Matrix Concepts Tutorials

Lecture 6 - Scattering Matrix Concepts Tutorials (Continued...)

Lecture 7 - Scattering Matrix Concepts Tutorials (Continued...)

Lecture 8 - Instantaneous form of Maxwellâ€™s equations

Lecture 9 - Instantaneous form of Maxwellâ€™s equations (Continued....)

Lecture 10 - Instantaneous form of Maxwellâ€™s equations (Continued...)

Lecture 11 - Instantaneous form of Maxwellâ€™s equations (Continued...)

Lecture 12 - Instantaneous form of Maxwellâ€™s equations (Continued...)

Lecture 13 - Instantaneous form of Maxwellâ€™s equations Tutorials

Lecture 14 - Instantaneous form of Maxwellâ€™s equations Tutorials (Continued...)

Lecture 15 - Harmonic form of Maxwellâ€™s equations

Lecture 16 - Harmonic form of Maxwellâ€™s equations (Continued...)

Lecture 17 - Harmonic form of Maxwellâ€™s equations (Continued...)

Lecture 18 - Harmonic form of Maxwellâ€™s equations Tutorials

Lecture 19 - Wave Equation and Solution

Lecture 20 - Relation between wavenumbers

Lecture 21 - Radiation from an electric current source (Continued...)

Lecture 22 - Radiation from an electric current source (Continued...)

Lecture 23 - Radiation from an electric current source (Continued...)

Lecture 24 - Wave Equation and Solution Tutorials

Lecture 25 - Radiation from an electric current source Tutorials

Lecture 26 - Radiation from a magnetic current source

Lecture 27 - Radiation from a magnetic current source (Continued...)

Lecture 28 - Radiation from a magnetic current source (Continued...)

Lecture 29 - Application of the magnetic current source (Continued...)

Lecture 30 - Radiation from a magnetic current source Tutorials

Lecture 31 - Radiation from a magnetic current source Tutorials (Continued....)

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

Lecture 32 - Discrete Time Modeling with Closed Current Loop

Lecture 33 - State-Space Modeling and Steps For Deriving Discrete-Time Models

Lecture 34 - Derivation of Discrete-Time Large-Signal Models

Lecture 35 - Validation of Discrete-Time Large-Signal Models using MATLAB - Part I

Lecture 36 - Validation of Discrete-Time Large-Signal Models using MATLAB - Part II

Lecture 37 - Derivation of Discrete-Time Small-Signal Models - I

Lecture 38 - Derivation of Discrete-Time Small-Signal Models - II

Lecture 39 - Discrete-Time Transfer Functions and Closed Loop Block Diagrams

Lecture 40 - Model Accuracy with MATLAB Case Studies - Comparative Study

Lecture 41 - Continuous-Time to Discrete-Time Conversion Methods - A Summary

Lecture 42 - Recap of Frequency Domain Design of Analog VMC and CMC

Lecture 43 - Design under Digital Voltage Mode Control - Frequency Domain Approaches

Lecture 44 - Design under Digital Current Mode Control - Frequency Domain Approaches

Lecture 45 - Design Case Study and MATLAB Simulation of Digital Voltage Mode Control

Lecture 46 - Design Case Study and MATLAB Simulation of Digital Current Mode Control

Lecture 47 - Time Optimal Control of a Buck Converter and Identifying Performance Limits

Lecture 48 - Trajectory based CMC Design for Proximate Time Optimal Recovery

Lecture 49 - Trajectory based Digital CMC Tuning and MATLAB Case Studies

Lecture 50 - Digital Pulse Skipping Control and MATLAB Simulation Case Studies

Lecture 51 - Selection of ADC and DAC in Digitally Controlled SMPCs

Lecture 52 - High Frequency Current Sensing Techniques in Digitally Controlled SMPCs

Lecture 53 - Current Sensing Techniques in Digitally Controlled High Power Converters

Lecture 54 - Signal Conditioning Circuits and PCB Design for Mixed-Signal Implementation

Lecture 55 - Reference Power Stage Design and Schematic for Buck and Boost Converters - I

Lecture 56 - Reference Power Stage Design and Schematic for Buck and Boost Converters - II

Lecture 57 - Step-by-Step Guidelines for Digital Control Implementation using FPGA

Lecture 58 - Test and Measurement of a Buck Converter using Digital Storage Oscilloscope

Lecture 59 - Functionalities in Mixed Signal Oscilloscope for Validating Digital Control

Lecture 60 - Power Spectrum Analysis of SMPCs using Mixed-Signal Oscilloscope

Lecture 61 - Introduction to Verilog Hardware Description Language (HDL)

Lecture 62 - Guidelines for Verilog HDL Programming - Some Key Rules

Lecture 63 - Structural and Dataflow Modeling in Verilog HDL for Combinational Logics

Lecture 64 - Behavioral Modeling in Verilog HDL for Sequential Digital Circuits

NPTEL : NOC:VLSI Interconnects (Electrical Engineering)

Co-ordinators : Prof. Sarang Pendharker

Lecture 1 - Introduction to VLSI interconnects

Lecture 2 - The distributed RC interconnect model

Lecture 3 - The Elmore delay

Lecture 4 - Elmore delay in interconnects

Lecture 5 - Elmore delay in branched RC interconnects

Lecture 6 - Equivalent circuit for RC interconnects

Lecture 7 - Scaling effects in interconnects

Lecture 8 - Delay mitigation in RC interconnects

Lecture 9 - RC interconnect simulation

Lecture 10 - Inductive effects in interconnects

Lecture 11 - Distributed RLC interconnect model

Lecture 12 - Transmission line equations

Lecture 13 - When to consider the inductive effects?

Lecture 14 - The transfer function of an RLC interconnect

Lecture 15 - Time domain response of a lumped RLC circuit

Lecture 16 - Equivalent Elmore model for RLC interconnects

Lecture 17 - Two-pole model of RLC interconnects from ABCD parameters

Lecture 18 - RLC interconnect simulation

Lecture 19 - Origin of the skin effect

Lecture 20 - Effective resistance at high frequencies

Lecture 21 - Equivalent circuit to simulate skin effect

Lecture 22 - Power dissipation due to interconnects

Lecture 23 - Optimum interconnect width for minimizing total power dissipation

Lecture 24 - Heating effects and thermal modeling

Lecture 25 - Compact thermal modeling with equivalent electrical circuits

Lecture 26 - Electromigration in interconnects

Lecture 27 - Mitigation of electromigration

Lecture 28 - Capacitive coupling in interconnects

Lecture 29 - Cross-talk and timing jitters in two identical interconnects

Lecture 30 - Coupling effects and mitigation techniques

Lecture 31 - Matrix formulation of coupled interconnects

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

Lecture 1 - The network concept

Lecture 2 - One-port network

Lecture 3 - One-port network, Two-port network

Lecture 4 - Two-port network, Signal flow graph

Lecture 5 - Tutorial - 1

Lecture 6 - General analysis of cylindrical waveguides

Lecture 7 - TE to z mode analysis of cylindrical waveguides

Lecture 8 - TE to z mode analysis of cylindrical waveguides (Continued...), TM to z mode analysis

Lecture 9 - Normalization of mode vectors, Characteristics of eigen values and eigen functions

Lecture 10 - Wave impedance for TE and TM to z modes, Transmission line analogy for mode voltage

Lecture 11 - Transmission line equivalence for TE and TM modes, Power calculation using

Lecture 12 - Tutorial - 2

Lecture 13 - Modal expansion in cylindrical waveguides, Concept of mode orthogonality

Lecture 14 - Concept of mode orthogonality (continued), Determination of arbitrary mode

Lecture 15 - Power orthogonality in cylindrical waveguides

Lecture 16 - Tutorial - 3

Lecture 17 - Modal expansion of fields in rectangular waveguides

Lecture 18 - Modal expansion of fields in rectangular waveguides (Continued), Capacitive rectangular

Lecture 19 - Capacitive rectangular waveguide junction (Continued...)

Lecture 20 - Inductive rectangular waveguide junction (Continued...)

Lecture 21 - Inductive rectangular waveguide junction (Continued...), Construction of solutions

Lecture 22 - Cylindrical waveguide junctions (Continued...)

Lecture 23 - Cylindrical waveguide junctions (Continued...)

Lecture 24 - Cylindrical waveguide junctions (Continued...), Example of capacitive rectangular

Lecture 25 - Cylindrical waveguide junctions (Continued...), Example of capacitive rectangular

Lecture 26 - Example of inductive waveguide junction (Continued...), Alternative equivalent circuit

Lecture 27 - Tutorial - 4

Lecture 28 - Obstacles in waveguides

Lecture 29 - Obstacles in waveguides (Continued...)

Lecture 30 - Obstacles in waveguides (Continued...)

Lecture 31 - Small obstacles in waveguides

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 : NOC:EMI-EMC and Signal Integrity: Principles, Techniques and Applications (Electrical Engineering)

Co-ordinators : Prof. Amitabha Bhattacharya

NPTEL : NOC:Embedded Sensing, Actuation and Interfacing Systems (Electrical Engineering)

Co-ordinators : Prof. Banibrata Mukherjee

NPTEL : NOC:A Basic Course on Electric and Magnetic Circuits (Electrical Engineering)

Co-ordinators : Prof. Ashok Kumar Pradhan

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

Co-ordinators : Dr. Krishna Vasudevan

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

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 98 - Large signal characteristics of pMOS CS amplifier with nMOS active load

Lecture 99 - Large signal characteristics of nMOS CS amplifier with pMOS active load

Lecture 100 - Large signal characteristics of a CMOS inverter

Lecture 101 - Active load amplifiers as digital gates

Lecture 102 - Sensitivity of output bias to input bias in a CMOS inverter

Lecture 103 - Self biasing a CMOS inverter

Lecture 104 - An application of self biased inverters

Lecture 105 - Current consumption of a self-biased inverter; Current biasing

Lecture 106 - Amplifying a difference signal; Differential pair

Lecture 107 - Differential pair-small signal basics

Lecture 108 - Biasing a differential pair

Lecture 109 - Differential pair with differential excitation

Lecture 110 - Differential pair with a current mirror load

Lecture 111 - Differential pair with a current mirror load - operating point

Lecture 112 - Differential pair with a current mirror load - Norton equivalent current

Lecture 113 - Differential pair with a current mirror load - Norton equivalent resistance

Lecture 114 - Common mode gain

Lecture 115 - Single stage opamp

Lecture 116 - Single stage opamp: Input common mode swing limits

Lecture 117 - Single stage opamp: Output swing limits

Lecture 118 - Which transistor type to use for the second stage?

Lecture 119 - Small signal gain

Lecture 120 - DC negative feedback biasing of all stages

Lecture 121 - DC negative feedback biasing of all stages (Continued...)

Lecture 122 - Small signal model

Lecture 123 - Swing limits

Lecture 124 - Systematic offset; How to eliminate it

Lecture 125 - Bipolar junction transistor(BJT): Large signal model

Lecture 126 - BJT model for calculating operating points

Lecture 127 - BJT small signal model

Lecture 128 - Biasing a BJT

Lecture 129 - Biasing a BJT, (Continued...)

Lecture 130 - Amplifiers using BJTs

Lecture 131 - PNP transistor

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

Co-ordinators : Prof. Gaurav Raina

Lecture 1 - A brief introduction to modelling

Lecture 2 - Dynamics and Nonlinear systems: getting started

Lecture 3 - 1-Dimensional Flows, Flows on the Line, Lecture 1

Lecture 4 - 1-Dimensional Flows, Flows on the Line, Lecture 2

Lecture 5 - 1-Dimensional Flows, Flows on the Line, Lecture 3

Lecture 6 - 1-Dimensional Flows, Flows on the Line, Lecture 4

Lecture 7 - 1-Dimensional Flows, Flows on the Line, Lecture 5

Lecture 8 - 1-Dimensional Flows, Flows on the Line, Lecture 6

Lecture 9 - 1-Dimensional Flows, Bifurcations, Lecture 1

Lecture 10 - 1-Dimensional Flows, Bifurcations, Lecture 2

Lecture 11 - 1-Dimensional Flows, Bifurcations, Lecture 3

Lecture 12 - 1-Dimensional Flows, Bifurcations, Lecture 4

Lecture 13 - 1-Dimensional Flows, Bifurcations, Lecture 5

Lecture 14 - 1-Dimensional Flows, Bifurcations, Lecture 6

Lecture 15 - 1-Dimensional Flows, Flows on the Circle, Lecture 1

Lecture 16 - 1-Dimensional Flows, Flows on the Circle, Lecture 2

Lecture 17 - 2-Dimensional Flows, Linear Systems, Lecture 1

Lecture 18 - 2-Dimensional Flows, Linear Systems, Lecture 2

Lecture 19 - 2-Dimensional Flows, Linear Systems, Lecture 3

Lecture 20 - 2-Dimensional Flows, Linear Systems, Lecture 4

Lecture 21 - 2-Dimensional Flows, Phase Plane, Lecture 1

Lecture 22 - 2-Dimensional Flows, Phase Plane, Lecture 2

Lecture 23 - 2-Dimensional Flows, Phase Plane, Lecture 3

Lecture 24 - 2-Dimensional Flows, Limit Cycles, Lecture 1

Lecture 25 - 2-Dimensional Flows, Limit Cycles, Lecture 2

Lecture 26 - 2-Dimensional Flows, Limit Cycles, Lecture 3

Lecture 27 - 2-Dimensional Flows, Bifurcations, Lecture 1

Lecture 28 - 2-Dimensional Flows, Bifurcations, Lecture 2

Lecture 29 - 2-Dimensional Flows, Bifurcations, Lecture 3

NPTEL : NOC:Control Engineering (Electrical Engineering)

Co-ordinators : Prof. Ramkrishna.P

NPTEL : NOC:Analog IC Design (Electrical Engineering)

Co-ordinators : Prof. S. Aniruddhan

Lecture 1 - Introduction to MOSFETs

Lecture 2 - Simple MOSFET Circuits

Lecture 3 - MOSFET Current Mirrors

Lecture 4 - Cascode Amplifiers

Lecture 5 - MOSFET in Integrated Circuits

Lecture 6 - MOSFET Capacitances

Lecture 7 - Noise

Lecture 8 - Noise of Simple Circuits

Lecture 9 - Systematic Mismatch

Lecture 10 - Random Mismatch

Lecture 11 - Differential Amplifiers

Lecture 12 - Negative Feedback

Lecture 13 - Stability of Negative Feedback Systems

Lecture 14 - Dominant Pole Compensation

Lecture 15 - Active Load

Lecture 16 - One Stage OpAmps - 1

Lecture 17 - One Stage OpAmps - 2

Lecture 18 - One Stage OpAmps - 3

Lecture 19 - Differential Amplifiers Offset

Lecture 20 - One Stage OpAmps - Noise and Offset

Lecture 21 - One Stage OpAmps - Slew Rate

Lecture 22 - One Stage OpAmps - Datasheet

Lecture 23 - One Stage OpAmps - Example 1

Lecture 24 - One Stage OpAmps - Example 2

Lecture 25 - Telescopic OpAmp - 1

Lecture 26 - Telescopic OpAmp - 2

Lecture 27 - Telescopic OpAmp - 3

Lecture 28 - Telescopic OpAmp - 4

Lecture 29 - Telescopic OpAmp - 5

Lecture 30 - Telescopic OpAmp - Datasheet

Lecture 31 - Telescopic OpAmp - Design Example

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

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

Lecture 32 - Marginal PMF

Lecture 33 - Trinomial joint PMF

Lecture 34 - Events and Conditioning with Two Random Variables

Lecture 35 - Example: compute marginal and conditional PMFs, probability of events

Lecture 36 - Independent random variables

Lecture 37 - More on independence

Lecture 38 - Example: IID Repetitions

Lecture 39 - Addition of Random Variables

Lecture 40 - Sum, Difference and Max of Two Random Variables

Lecture 41 - More Computations: Min of Two Random Variables

Lecture 42 - Example: X+Y, X-Y, min(X,Y), max(X,Y)

Lecture 43 - Real line as sample space

Lecture 44 - Probability density function (pdf)

Lecture 45 - Cumulative distribution function (CDF)

Lecture 46 - Continuous random variables

Lecture 47 - pdf and CDF of continuous random variables

Lecture 48 - Spinning pointer example

Lecture 49 - Important continuous distributions

Lecture 50 - More continuous distributions

Lecture 51 - Two-dimensional real sample space

Lecture 52 - Joint pdf and joint CDF

Lecture 53 - More on assigning probability to regions of x-y plain

Lecture 54 - Darts example and marginal pdfs

Lecture 55 - Independence to two continuous random variables

Lecture 56 - Examples: two independent continuous random variables

Lecture 57 - Prob[X > Y]: computation of probability of a non-rectangular region

Lecture 58 - Transformations of random variables

Lecture 59 - CDF method

Lecture 60 - pdf method

Lecture 61 - Examples

Lecture 62 - One-to-one transformations

Lecture 63 - Expected Value or Mean of a Random Variable

Lecture 64 - Properties of Expectation

NPTEL : NOC:Introduction to Photonics (Electrical Engineering)

Co-ordinators : Prof. Balaji Srinivasan

Lecture 1 - Introduction to Photonics

Lecture 2 - Diffraction and Interference

Lecture 3 - Tutorial on Ray Optics and Wave Optics

Lecture 4 - Lab Demonstration : Diffractions and Interference

Lecture 5 - Interferometers

Lecture 6 - Coherence

Lecture 7 - Spatial and Temporal Coherence

Lecture 8 - Tutorial on Wave Optics

Lecture 9 - Lab Demonstration: Michelson Interferometer

Lecture 10 - Electromagnetic Optics

Lecture 11 - Fiber Optics

Lecture 12 - Photon Properties

Lecture 13 - Lab Demonstration: Fiber modes, NA and MFD

Lecture 14 - Photon Optics

Lecture 15 - Tutorial on Photon optics

Lecture 16 - Photon interaction - 1

Lecture 17 - Photon interaction - 2

Lecture 18 - Lab Demonstration: Interaction of light with matter

Lecture 19 - Optical Amplification

Lecture 20 - Three Level systems

Lecture 21 - Four Level Systems

Lecture 22 - EDFA Introduction

Lecture 23 - EDFA Tutorial

Lecture 24 - Lasers Part - 1

Lecture 25 - Lab Demonstration: EDFA Characterization

Lecture 26 - Lasers part- 2

Lecture 27 - Lasers part- 3

Lecture 28 - Lasers part- 4

Lecture 29 - Lab Demonstration: Fiber Laser

Lecture 30 - Semiconductor light Source and detector - Band structure

Lecture 31 - Semiconductor light Source and detector - Light emission

Lecture 32 - Semiconductor light Source and detector LED Characteristics

Lecture 33 - Lab Demonstration: Semiconductor Sources

Lecture 34 - Semiconductor light Source and detector Laser Characteristics

Lecture 35 - Semiconductor Detectors - 1

Lecture 36 - Semiconductor Detectors - 2

Lecture 37 - Semiconductor Detectors - 3

Lecture 38 - Lab Demonstration: Semiconductor Detectors

Lecture 39 - Semiconductor Detectors - 4

Lecture 40 - Light manipulation-Mallus' Law

Lecture 41 - Light manipulation-Birefringence

Lecture 42 - Light manipulation-Faraday Rotation

Lecture 43 - Lab Demonstration: Manipulation of Light Intensity and Polarization

Lecture 44 - Non-linear optics-Pockels effect

Lecture 45 - Non-linear optics-Kerr Effect

Lecture 46 - Lab Demonstration: Manipulation of Light Electro Optic Modulator (EOM)

Lecture 47 - Non-linear optics-stimulated Brillouin scattering

Lecture 48 - Non-linear optics-stimulated Raman scattering

NPTEL : NOC:Multirate DSP (Electrical Engineering)

Co-ordinators : Prof. David Kovil Pillai

Lecture 32 - Transmultiplexer and Maximally Decimated Filterbanks - Part 1

Lecture 33 - Transmultiplexer and Maximally Decimated Filterbanks - Part 2

Lecture 34 - Maximally Decimated Filterbanks 2 - Part 1

Lecture 35 - Maximally Decimated Filterbanks 2 - Part 2

Lecture 36 - Study of Two-channel filter bank

Lecture 37 - Introduction to Quadrature Mirror Filters (QMF)

Lecture 38 - 2-channel QMF Filter Bank Design

Lecture 39 - Study of All-pass filters

Lecture 40 - Study of All-pass lattice

Lecture 41 - All-pass decomposition, the study of Mth band and Nyquist filters

Lecture 42 - Study of two-channel filter bank with perfect reconstruction

Lecture 43 - First part name : Perfect Reconstruction Final Overview. Second part name : Introduction to OFDM- Motivation - Part 1

Lecture 44 - First part name : Perfect Reconstruction Final Overview. Second part name : Introduction to OFDM- Motivation - Part 2

Lecture 45 - Capacity of wireless channels - CSIR - Part 1

Lecture 46 - Capacity of wireless channels - CSIT - Part 2

Lecture 47 - Capacity of wireless channels - Formulation of capacity calculation - Part 3

Lecture 48 - Capacity of wireless channels - Formulation of capacity calculation (Continued...) - Part 1

Lecture 49 - Capacity of wireless channels - Formulation of capacity calculation (Continued...) - Part 2

Lecture 50 - Capacity of wireless channels - Time-invariant Frequency selective channel - Part 3

Lecture 51 - Capacity of wireless channels - Time varying Frequency selective channels - Part 1

Lecture 52 - Multi-rate DSP framework for Multi-carrier Modulation - Part 2

Lecture 53 - MCM with overlapping spectra - Part 1

Lecture 54 - Recap of multirate DSP concepts for building OFDM - Part 2

Lecture 55 - Introduction to Redundancy and it's implementation in multi-rate framework - Part 3

Lecture 56 - M-channel multicarrier Transceiver - Part 1

Lecture 57 - M-channel multicarrier Transceiver - Part 2

Lecture 58 - M-channel multicarrier Transceiver - Part 3

Lecture 59 - Pseudo -circulant structure - Part 1

Lecture 60 - Pseudo -circulant structure - Part 2

Lecture 61 - MCM impairments and CP - Part 1

Lecture 62 - MCM impairments and CP - Part 2

Lecture 63 - Orthogonal Frequency Division Multiplexing - Part 1

Lecture 64 - Orthogonal Frequency Division Multiplexing - Part 2

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

Lecture 32 - Differentiation in the Z-domain

Lecture 33 - Convolution in the time domain

Lecture 34 - Relationship between x[n] and X(1)

Lecture 35 - Initial Value Theorem

Lecture 36 - Final Value Theorem

Lecture 37 - Multiplication in the time domain

Lecture 38 - Parseval's Theorem

Lecture 39 - Partial Fractions Method

Lecture 40 - Power series method

Lecture 41 - Contour Integral Method

Lecture 42 - Contour Integral Method (Continued...)

Lecture 43 - Inverse DTFT

Lecture 44 - DTFT of Sequences that are not absolutely summable

Lecture 45 - Response to cos(?_0 n+?)

Lecture 46 - Causality and Stability

Lecture 47 - Response to suddenly applied inputs

Lecture 48 - Introduction to frequency response

Lecture 49 - Magnitude response and its geometric interpretation

Lecture 50 - Magnitude Response (Continued...)

Lecture 51 - Response of a single complex zero/pole

Lecture 52 - Resonator and Improved Resonator

Lecture 53 - Notch filter

Lecture 54 - Moving Average Filter

Lecture 55 - Comb filter

Lecture 56 - Phase response of a single complex zero

Lecture 57 - Effect of crossing a unit circle zero, wrapped and unwrapped phase, resonator phase response

Lecture 58 - Allpass Filter

Lecture 59 - Group delay and its physical interpretation

Lecture 60 - Zero-phase filtering, effect on nonlinear phase on waveshape

Lecture 61 - Zero-Phase Filtering, Linear Phase - 1

Lecture 62 - Linear Phase - 2

Lecture 63 - Linear Phase - 3

Lecture 64 - Linear Phase - 3

NPTEL : NOC:Computational Electromagnetics (Electrical Engineering)

Co-ordinators : Prof. Uday Khankhoje

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 1 - Introduction to PMIC - Part 1

Lecture 2 - Introduction to PMIC - Part 2

Lecture 3 - Linear versus Switching Regulators

Lecture 4 - Performance Parameters of Regulators

Lecture 5 - Local vs Remote Feedback, Point of Load Regulators

Lecture 6 - Kelvin Sensing, Droop Compensation

Lecture 7 - Current Regulator Applications, Introduction to Bandgap Voltage References, PTAT and CTAT voltage

Lecture 8 - Adding PTAT and CTAT Voltages

Lecture 9 - Bandgap Voltage Reference Circuit, Brokaw Bandgap Circuit

Lecture 10 - Sub-1-volt Bandgap Circuit

Lecture 11 - Generating Multiple Reference Voltages; Applications of Linear Regulators

Lecture 12 - Designing a Linear Regulator, Negative and Positive Feedback

Lecture 13 - First-Order Systems, Phase Margin

Lecture 14 - Closed-Loop Response of Second-Order Systems

Lecture 15 - Relationship between Damping Factor and Phase Margin, Frequency Compensation, MOS Parasitic Capacitances

Lecture 16 - Finding the Poles of the Error Amplifier - Part 1

Lecture 17 - Finding the Poles of the Error Amplifier - Part 2

Lecture 18 - Dominant Pole Frequency Compensation

Lecture 19 - Dominant Pole Compensation at No-Load

Lecture 20 - Dominant Pole Compensation using Miller Effect, RHP zero due to Miller Capacitor

Lecture 21 - Intuitive Method of Finding the Poles, Pole Splitting after Miller Compensation

Lecture 22 - Effect of RHP zero on Stability, Mitigating the Effect of RHP zero, LDO with NMOS Pass Element

Lecture 23 - Output Impedance of PMOS LDO

Lecture 24 - Line Regulation and PSRR of PMOS LDO

Lecture 25 - PSRR of PMOS versus PSRR of NMOS LDO

Lecture 26 - Sources of Error in Linear and Switching Regulators

Lecture 27 - Offset in Amplifiers; Real Life Analogy; Static Offset Cancellation

Lecture 28 - Dynamic Offset Cancellation Techniques (Chopping, Auto-zeroing)

Lecture 29 - Digital LDO, Technique to Avoid Limit Cycle Oscillations in Digital LDO

Lecture 30 - Hybrid LDO, Short-Circuit Protection

Lecture 31 - Hiccup Mode and Foldback Current Limit

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

Lecture 56 - Introduction to Type-III Compensator

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

Lecture 1 - Course contents

Lecture 2 - Introduction

Lecture 3 - Historical developments

Lecture 4 - Power semiconductor devices

Lecture 5 - General converter configuration

Lecture 6 - Choice of converter configuration: Valve utilization factor

Lecture 7 - Choice of converter configuration: Transformer utilization factor

Lecture 8 - Converter configuration for pulse number equal to 6

Lecture 9 - Analysis of 6 pulse LCC neglecting inductance

Lecture 10 - Analysis of 6 pulse LCC neglecting inductance: Jumps in voltage across a valve

Lecture 11 - Analysis of 6 pulse LCC neglecting inductance: Average DC side voltage

Lecture 12 - Fourier series - Part 1

Lecture 13 - Fourier series - Part 2

Lecture 14 - Analysis of 6 pulse LCC neglecting inductance: DC side voltage harmonics

Lecture 15 - Analysis of 6 pulse LCC neglecting inductance: Fundamental and harmonic components of AC side current

Lecture 16 - Definitions: Delay angle, angle of advance, commutation margin angle

Lecture 17 - Commutation margin angle in a 6 pulse LCC neglecting inductance - Part 1

Lecture 18 - Commutation margin angle in a 6 pulse LCC neglecting inductance - Part 2

Lecture 19 - Instantaneous power on AC and DC sides in a 6 pulse LCC neglecting inductance

Lecture 20 - Average power on AC and DC sides in a 6 pulse LCC neglecting inductance

Lecture 21 - 6 pulse LCC with inductance

Lecture 22 - 2 and 3 valve conduction mode of 6 pulse LCC

Lecture 23 - 2 and 3 valve conduction mode of 6 pulse LCC: DC side voltage harmonics

Lecture 24 - 2 and 3 valve conduction mode of 6 pulse LCC: DC side voltage and voltage across a valve

Lecture 25 - 2 and 3 valve conduction mode of 6 pulse LCC: Fundamental and harmonic components of AC side current

Lecture 26 - Extinction angle

Lecture 27 - Extinction angle: Commutation margin angle for normal inverter operation of 6 pulse LCC

Lecture 28 - 3 and 4 valve conduction mode of 6 pulse LCC

Lecture 29 - Analysis of 3 and 4 valve conduction mode of 6 pulse LCC - Part 1

Lecture 30 - Analysis of 3 and 4 valve conduction mode of 6 pulse LCC - Part 2

Lecture 31 - Analysis of 3 and 4 valve conduction mode of 6 pulse LCC - Part 3

Lecture 32 - 3 valve conduction mode of 6 pulse LCC

Lecture 33 - Commutation margin angle

Lecture 34 - Normalization

Lecture 35 - Characteristics of 6 pulse LCC - Part 1

Lecture 36 - Characteristics of 6 pulse LCC - Part 2

Lecture 37 - Steady state analysis of a general LCC - Part 1

Lecture 38 - Steady state analysis of a general LCC - Part 2

Lecture 39 - Steady state analysis of a general LCC - Application to 6 pulse LCC

Lecture 40 - 6 pulse LCC with resistance included on the AC side

Lecture 41 - 6 pulse LCC with resistance, inductance and voltage source on the DC side - Part 1

Lecture 42 - 6 pulse LCC with resistance, inductance and voltage source on the DC side - Part 2

Lecture 43 - Power factor

Lecture 44 - Capacitor commutated converter - Part 1

Lecture 45 - Capacitor commutated converter - Part 2

Lecture 46 - 12 pulse LCC - Part 1

Lecture 47 - 12 pulse LCC - Part 2

Lecture 48 - Modes of operation of 12 pulse LCC

Lecture 49 - Purposes of transformer

Lecture 50 - Applications of DC transmission

Lecture 51 - Types of DC link: Monopolar

Lecture 52 - Types of DC link: Bipolar and homopolar

Lecture 53 - DC link control

Lecture 54 - DC link control: Control variables

Lecture 55 - Considerations that influence selection of control

Lecture 56 - Converter control characteristics

Lecture 57 - MTDC systens: Applications

Lecture 58 - Types of MTDC systems

Lecture 59 - Non-characteristic harmonics

Lecture 60 - Effect of firing angle errors

Lecture 61 - Problems with harmonics

Lecture 62 - Single tuned filter

Lecture 63 - Design of single tuned filter - Part 1

Lecture 64 - Design of single tuned filter - Part 2

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

Lecture 32 - Overview of Systems and General Properties

Lecture 33 - Linearity and Time Invariance

Lecture 34 - LTI System Examples

Lecture 35 - Frequency Response of RLC circuits - I

Lecture 36 - Frequency Response of RLC circuits - II

Lecture 37 - LCCDE Representation of Continuous-Time LTI Systems

Lecture 38 - Frequency Domain Representation of LCCDE Systems

Lecture 39 - Time Domain Representation of LTI Systems

Lecture 40 - Continuous-Time Convolution Integral

Lecture 41 - Continuous-Time Convolution : Example I

Lecture 42 - Continuous-Time Convolution : Example II

Lecture 43 - Continuous-Time Convolution : Example III

Lecture 44 - LTI Systems : Commutative, Distributive and Associative

Lecture 45 - LTI Systems : Memorylessness and Invertibility

Lecture 46 - LTI Systems : Causality and Stability

Lecture 47 - Fourier Transform in Complex Frequency Domain

Lecture 48 - Laplace Transform : Poles and Zeros

Lecture 49 - Laplace Transform : Region of Convergence [ROC]

Lecture 50 - Laplace Transform : Examples I

Lecture 51 - Laplace Transform : Examples II

Lecture 52 - Laplace Analysis of LTI Systems

Lecture 53 - Laplace Analysis of RLC Circuits - I

Lecture 54 - Laplace Transform : Linearity, Shifting and Scaling

Lecture 55 - Laplace Transform : Derivative and Integral

Lecture 56 - Laplace Transform : Causality and Stability

Lecture 57 - Laplace Analysis of LTI Systems : Example I

Lecture 58 - Laplace Analysis of LTI Systems : Example II

Lecture 59 - Laplace Analysis of First Order RLC Circuits

Lecture 60 - Laplace Analysis of Second Order RLC Circuits

Lecture 61 - Fourier Transform of Periodic Signals

Lecture 62 - Fourier Series Representation in Continuous-Time

Lecture 63 - Fourier Series Properties - I

Lecture 64 - Fourier Series Properties - II

Lecture 65 - LTI System Response for Periodic Input Signal

Lecture 66 - Fourier Series in Continuous-Time : Examples I

Lecture 67 - Fourier Series in Continuous-Time : Examples II

Lecture 68 - Discrete-Time Convolution Sum

Lecture 69 - Discrete-Time Convolution Sum Examples and Properties

Lecture 70 - LCCDE Representation of Discrete-Time LTI Systems

Lecture 71 - Impulse Train Sampling

Lecture 72 - Reconstruction of Continuous-Time Signal

Lecture 73 - Nyquist Sampling Theorem and Aliasing

Lecture 74 - Fourier Transform of Sampled Signals

Lecture 75 - DTFT : Examples I

Lecture 76 - DTFT Properties I: Periodicity, Linearity, Time/Frequency shifting, and Conjugation

Lecture 77 - DTFT Properties II: Differencing and Accumulation in Time Domain, Differentiation in Frequency Domain

Lecture 78 - DTFT Properties III: Time Reversal, Time Expansion, Convolution and Parsevaalâ€™s Relation

Lecture 79 - DTFT : Examples II

Lecture 80 - DTFT in Complex Frequency Domain

Lecture 81 - Z-Transform : Properties of ROC

Lecture 82 - Z-Transform Properties I: Linearity, Time-Shifting, Time-Expansion, Time-Reversal, and Z-Scaling

Lecture 83 - Z-Transform Properties II: Conjugation and Convolution

Lecture 84 - Z-Transform Properties III: Causality and Stability

Lecture 85 - Z-Transform : Examples I

Lecture 86 - Z-Transform : Examples II

Lecture 87 - Block Diagram Representation

NPTEL : NOC:Linear Dynamical Systems (Electrical Engineering)

Co-ordinators : Prof. Tushar Jain

Lecture 1 - Response and state-space solution of Linear systems

Lecture 2 - Solution of LTV systems

Lecture 3 - Solution of LTI systems

Lecture 4 - Equivalent State Equations

Lecture 5 - Realization of LTI and LTV Systems

Lecture 6 - Tutorial - 1

Lecture 7 - Introduction to Stability Analysis

Lecture 8 - Lyapunov Stability - Part I

Lecture 9 - Lyapunov Stability - Part II

Lecture 10 - Proof of lyapunov stability theorem

Lecture 11 - BIBO vs Lyapunov Stability

Lecture 12 - BIBO vs Lyapunov Stability

Lecture 13 - Tutorial - 2

Lecture 14 - Introduction to Controllability

Lecture 15 - Reachability and Controllability Gramians

Lecture 16 - Controllability Matrix

Lecture 17 - Discrete-time Reachability and Controllability Gramians

Lecture 18 - Tests for controllability - I

Lecture 19 - Tests for controllability - II

Lecture 20 - Tutorial - 3

Lecture 21 - Tests for controllability - III

Lecture 22 - Tests for controllability - IV

Lecture 23 - Controllable Decomposition - I

Lecture 24 - Stabilizable Systems

Lecture 25 - Tests for Stabilizability

Lecture 26 - Tutorial - 4

Lecture 27 - State Feeback - I

Lecture 28 - State Feeback - II

Lecture 29 - Lyapunov Method of State Feedback Design

Lecture 30 - Regulation and Tracking

Lecture 31 - Tutorial - 5

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 32 - Assignment Discussion - Week 3

Lecture 33 - Recap of direction modulation consequences

Lecture 34 - Noise in Lasers

Lecture 35 - Relative Intensity Noise

Lecture 36 - Laser Phase Noise - 1

Lecture 37 - Laser Phase Noise - 2

Lecture 38 - Effect of Laser Phase Noise: A case study

Lecture 39 - Electro-optic phase modulation

Lecture 40 - Electro-optic intensity modulator

Lecture 41 - Biasing of MZM: BPSK Generation

Lecture 42 - Biasing of MZM: QPSK and 16 QAM Generation

Lecture 43 - Line coding schemes and their bandwidth requirements

Lecture 44 - Assignment Discussion - Week 4

Lecture 45 - Introduction to optical Fiber

Lecture 46 - Attenuation in optical fibers

Lecture 47 - Fiber Modes

Lecture 48 - Modes of a step index fiber - 1

Lecture 49 - Modes of a step index fiber - 2

Lecture 50 - Modes of a step index fiber - 3

Lecture 51 - Modes of a step index fiber - 4

Lecture 52 - Modes of a step index fiber - 5

Lecture 53 - Modes and Cut-off conditions

Lecture 54 - Universal b-V curves

Lecture 55 - Modal Profiles in step index fiber

Lecture 56 - Mode Field Diameter

Lecture 57 - Dispersion- Intermodal dispersion derivation

Lecture 58 - Dispersion-Bit rate distance Product

Lecture 59 - Phase Velocity and Group Velocity - 1

Lecture 60 - Phase Velocity and Group Velocity - 2

Lecture 61 - Material dispersion

Lecture 62 - Waveguide dispersion

Lecture 63 - Total Dispersion in optical fiber

Lecture 64 - Polarization mode dispersion

Lecture 98 - Stimulated Raman Scattering

Lecture 99 - Components - Directional Couplers

Lecture 100 - Components - VOA, Polariser, Polarisation Controllers

Lecture 101 - Components - Isolator

Lecture 102 - Components - Circulator, Definitions

Lecture 103 - Components - Wavelength filters

Lecture 104 - Components - Arrayed Waveguide Gratings, WSS

Lecture 105 - Balanced Detection

Lecture 106 - Polarisation Diverse Coherent Receiver

Lecture 107 - Phase and Polarisation Diverse Coherent Reciever

Lecture 108 - Overview of impairments in coherent optical communication

Lecture 109 - Transceiver impairments - Generation and Compensation

Lecture 110 - Channel Impairments - Generation and Compensation

Lecture 111 - Demo video

Lecture 112 - Introduction to Optical Networks

Lecture 113 - Layers of Optical Network

Lecture 114 - SDH/SONET Layering, Frame Structure

Lecture 115 - Physical Networks Topologies

Lecture 116 - Topology specific Link Design

Lecture 117 - Network Protection

Lecture 118 - Access Networks- PON

Lecture 119 - Optical Interconnects, Data Centers

Lecture 120 - Optical communication for Wireless Fronthauling

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

Lecture 65 - Substitution theorem: Voltage source

Lecture 66 - Substituting a voltage or current source with a resistor

Lecture 67 - Extensions to Superposition and Substitution theorem

Lecture 68 - Thevenin's theorem

Lecture 69 - Worked out example: Thevenin's theorem

Lecture 70 - Norton's theorem

Lecture 71 - Worked out example: Norton's theorem

Lecture 72 - Maximum power transfer theorem

Lecture 73 - Preliminaries

Lecture 74 - Two port parameters

Lecture 75 - y parameters

Lecture 76 - y parameters: Examples

Lecture 77 - z parameters

Lecture 78 - z parameters: Examples

Lecture 79 - h parameters

Lecture 80 - h parameters: Examples

Lecture 81 - g parameters

Lecture 82 - g parameters: Examples

Lecture 83 - Calculations with a two-port element

Lecture 84 - Calculations with a two-port element

Lecture 85 - Degenerate cases

Lecture 86 - Relationships between different two-port parameters

Lecture 87 - Equivalent circuit representation of two-ports

Lecture 88 - Reciprocity

Lecture 89 - Proof of reciprocity of resistive two-ports

Lecture 90 - Proof for 4-terminal two-ports

Lecture 91 - Reciprocity in terms of different two-port parameters

Lecture 92 - Reciprocity in circuits containing controlled sources

Lecture 93 - Examples

Lecture 94 - Feedback amplifier using an opamp

Lecture 95 - Ideal opamp

Lecture 96 - Negative feedback around the opamp

Lecture 97 - Finding opamp sign for negative feedback

NPTEL : NOC:Optical Fiber Sensors (Electrical Engineering)

Co-ordinators : Prof. Balaji Srinivasan

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

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

Lecture 32 - Elementary Renewal Theorem

Lecture 33 - The Renewal Equation

Lecture 34 - The Renewal Equation (Continued...)

Lecture 35 - G/G/1 Queue and Little's theorem

Lecture 36 - Little's theorem

Lecture 37 - M/G/1 Queue

Lecture 38 - M/G/1 Queue and PK Formula

Lecture 39 - M/G/1 Queue and PK Formula (Continued...)

Lecture 40 - Ensemble rewards - Age and Duration

Lecture 41 - Ensemble rewards - Age and Duration (Continued...)

Lecture 42 - Key Renewal Theorem and Ensemble rewards

Lecture 43 - Introduction to finite state Discrete Time Markov Chains

Lecture 44 - Class and Types of Classes in a DTMC

Lecture 45 - Periodicity in a DTMC

Lecture 46 - Matrix Representation of a DTMC

Lecture 47 - The long term behaviour of a DTMC

Lecture 48 - Stationary Distribution and Long term behaviour of a DTMC - Part 1

Lecture 49 - Stationary Distribution and Long term behaviour of a DTMC - Part 2

Lecture 50 - Stationary Distribution and Long term behaviour of a DTMC - Part 3

Lecture 51 - Spectral Properties of Stochastic Matrices - Part 1

Lecture 52 - Spectral Properties of Stochastic Matrices - Part 2

Lecture 53 - The Short-term Behaviour of a DTMC

Lecture 54 - Introduction to Countable-state DTMC

Lecture 55 - Introduction to Countable-state DTMC (Continued...)

Lecture 56 - The Strong Markov Property

Lecture 57 - Renewal Theory applied to DTMC's

Lecture 58 - Stationary Distribution of a Countable State Space DTMC and Renewal Theory

Lecture 59 - Stationary Distribution of a Countable State Space DTMC and Renewal Theory (Continued...)

Lecture 60 - Stationary Distribution and The Steady State Behaviour of a Countable-state DTMC - Part 1

Lecture 61 - Stationary Distribution and The Steady State Behaviour of a Countable-state DTMC - Part 2

Lecture 62 - Convergence to Steady State of a Coutable-state DTMC (Stochastic Coupling)

Lecture 63 - The Birth-Death Markov Chains

Lecture 64 - The Reversibility Markov Chains

Lecture 65 - The Reversibility Markov Chains (Continued...)

Lecture 66 - Time Sampled M/M/1 Queue and The Burke's Theorem

Lecture 67 - Introduction to Continuous Time Markov Chains

Lecture 68 - Introduction to CTMC (Continued...)

Lecture 69 - The Steady State Behaviour of CTMC - Part 1

Lecture 70 - The Steady State Behaviour of CTMC - Part 2

Lecture 71 - The Steady State Behaviour of CTMC - Part 3

Lecture 72 - The Steady State Behaviour of CTMC - Part 4

Lecture 73 - The chapman-kolmogrov equations for CTMC's

Lecture 74 - The Birth-Death Continuous time Markov Chains

Lecture 75 - The Reversibility of Continuous time Markov Chains

Lecture 76 - Burke's Theorem and the Tandem Queues - Part 1

Lecture 77 - Burke's Theorem and the Tandem Queues - Part 2

Lecture 78 - The Jackson Networks - Part 1

Lecture 79 - The Jackson Networks - Part 2

Lecture 80 - Semi Markov Processes - Part 1

Lecture 81 - Semi Markov Processes - Part 2

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

Co-ordinators : Prof. Bijoy Krishna Das

Lecture 1 - Course Background and Learning Outcome

Lecture 2 - Moore's Law and Interconnect Bottleneck

Lecture 3 - Progress in Optical Interconnect Technology and Beyond

Lecture 4 - Evolution of Silicon Photonics Platform

Lecture 5 - Fundamentals of Lightwaves: EM Waves: Maxwell Equations and Plane Wave Solutions

Lecture 6 - Fundamentals of Lightwaves: EM Waves: Wave Propagation in Lossy Dielectric Medium

Lecture 7 - Fundamentals of Lightwaves: EM Waves in Metals and Semiconductors

Lecture 8 - Fundamentals of Lightwaves: EM Waves: Plasma Dispersion

Lecture 9 - Fundamentals of Lightwaves: EM Waves Principle of Optical Waveguiding

Lecture 10 - Fundamentals of Lightwaves: 1-D Optical Waveguide: Ray Optics Model

Lecture 11 - Optical Waveguides: Theory and Design: TIR Based Eigen Mode Solutions for Slab Waveguides

Lecture 12 - Optical Waveguides: Theory and Design: TIR Based Design Solutions for Slab Waveguides

Lecture 13 - Optical Waveguides: Theory and Design: Guided ModeSolutions for Slab Waveguides

Lecture 14 - Optical Waveguides: Theory and Design: Guided ModeSolutions for Slab Waveguides cont

Lecture 15 - Optical Waveguides: Theory and Design: Guided Mode Dispersionand Power in Slab Waveguides

Lecture 16 - Optical Waveguides: Theory and Design: Optical Waveguide with 2D confinement

Lecture 17 - Optical Waveguides: Theory and Design: Dispersion and Polarization of Guided Modes

Lecture 18 - Optical Waveguides: Theory and Design: Orthogonalityof Guided Modes

Lecture 19 - Optical Waveguides: Theory and Design: Coupled Mode Theoryof Guided Modes

Lecture 20 - Optical Waveguides: Theory and Design: Coupled Mode Theory (Continued...)

Lecture 21 - Optical Waveguides: Theory and Design: Coupled Mode Theory (Continued...)

Lecture 22 - Integrated Optical Components: Y-Junction Power Splitter/Combiner and Mach-Zehnder Interferometer

Lecture 23 - Integrated Optical Components: Directional Coupler: Coupled Waveguides

Lecture 24 - Integrated Optical Components: Directional Coupler: Coupled Waveguides (Continued...)

Lecture 25 - Integrated Optical Components: Directional Coupler: Design and Modelling

Lecture 26 - Integrated Optical Components: DC based MZI and Microring Resonator (MRR)

Lecture 27 - Integrated Optical Components: Microring Resonator (MRR): Passive Characteristics

Lecture 28 - Integrated Optical Components: Distributed Bragg Reflector (DBR)

Lecture 29 - Integrated Optical Components: Distributed Bragg Reflector (DBR): Device Design - Part 1

Lecture 30 - Integrated Optical Components: Distributed Bragg Reflector (DBR): Device Design - Part 2

Lecture 31 - Tunable Devices and Reconfigurable Circuits: Phase Error Interference

Lecture 32 - Tunable Devices and Reconfigurable Circuits: Post Fabrication Phase Error Corrections

Lecture 33 - Tunable Devices and Reconfigurable Circuits: Thermo-Optic Switching and Tuning

Lecture 34 - Tunable Devices and Reconfigurable Circuits: Programmable Silicon Photonics

Lecture 35 - Electro-Optic Modulators for Integrated Photonics: Basic Design and Working Principle

Lecture 36 - Electro-Optic Modulators for Integrated Photonics: Various Physical Mechanisms

Lecture 37 - Electro-Optic Modulators for Integrated Photonics: FCCE Based Silicon Photonics Modulator

Lecture 38 - Light Sources and Photodetectors for Integrated Photonics: Integrated Photonic light Sources - Part 1

Lecture 39 - Light Sources and Photodetectors for Integrated Photonics: Integrated Photonic light Sources - Part 2

Lecture 40 - Light Sources and Photodetectors for Integrated Photonics: Photodetectors for Silicon Photonics

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

Lecture 65 - Three phase AC - Part 1

Lecture 66 - Three phase AC - Part 2

Lecture 67 - Thermal Design - Part 1

Lecture 68 - Thermal Design - Part 2

Lecture 69 - Thermal Design - Part 3

Lecture 70 - Engineering Considerations - Part 1

Lecture 71 - Engineering Considerations - Part 2

Lecture 72 - Engineering Considerations - Part 3 and Future Frontiers

Lecture 73 - EV Charger Introduction

Lecture 74 - Charger Paramaters and Types

Lecture 75 - Slow Fast chargers and Swapping

Lecture 76 - Swapping

Lecture 77 - Standardization and on board chargers

Lecture 78 - Public chargers

Lecture 79 - Public charger economics in Indian Context

Lecture 80 - Bulk Chargers, Swapping stations and data analytics

Lecture 81 - Introduction to Energy Scenario in India - Part 1

Lecture 82 - Introduction to Energy Scenario in India - Part 2

Lecture 83 - A novel Approach towards 100% RE in India - Part 1

Lecture 84 - A novel Approach towards 100% RE in India - Part 2

Lecture 85 - Going Beyond solar, wind, Li Ion and chilled water storage

Lecture 86 - Solar Photovoltaic

Lecture 87 - Solar Cell and its Characteristics

Lecture 88 - Solar Cells to Modules

Lecture 89 - Wind Energy

Lecture 90 - The War of Currents

Lecture 91 - The Birth of Solar - DC

Lecture 92 - Storage Options for Energy - Part 1

Lecture 93 - Storage Options for Energy - Part 2

Lecture 94 - Storage Options for Energy - Part 3

Lecture 95 - Storage Options for Energy - Part 4

Lecture 96 - The EV Ecosystem - Part 1

Lecture 97 - The EV Ecosystem - Part 2

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

Lecture 1 - Introduction Linear and Nonlinear Network

Lecture 2 - Small Signal Analysis of Nonlinear Networks

Lecture 3 - Small Signal Analysis

Lecture 4 - Incremental Model for Common Two Terminal Element Passive Two Terminal Elements

Lecture 5 - Linear and Nonlinear Two Ports and the Incremental Y Matrix

Lecture 6 - Graphical Representation of the Y Matrix

Lecture 7 - Nonlinear Two Ports With Incremental Gain

Lecture 8 - IV Charateristic of a Nonlinear 2 port with Incremental Gain

Lecture 9 - The MOSFET and its Characterisitics

Lecture 10 - Deriving the Common V Source Amplifier - Part 1

Lecture 11 - The Common Source Amplifier

Lecture 12 - Large Signal Behaviour of the Common Source Amplifier

Lecture 13 - The Common Source Amplifier Swing Limits

Lecture 14 - Introduction to Robust Biasing

Lecture 15 - Robust Biasing Part 1 Common Source Amplifier with DC Drain Feedback

Lecture 16 - Robust Biasing with the Current Mirror and Drain Gate Resistor

Lecture 17 - Robust Baising With Source Feedback - Part 1

Lecture 18 - Robust Biasing with Source Feedback - Part 2

Lecture 19 - Robust Biasing with Source Degeneration

Lecture 20 - Introduction to Negative Feedback

Lecture 21 - The Ideal Operational Amplifier

Lecture 22 - Negative Feedback (Continued...)

Lecture 23 - Robust Baising with Drain Measurement and Source Feedback

Lecture 24 - Robust biasing with source measurement and gate feedback

Lecture 25 - The Incremental Voltage Controlled Voltage Source The Common drain Amplifier Incremental Picture

Lecture 26 - Baising of the Common Drain Amplifier and Signal Swings

Lecture 27 - The VCVS Continued, the Incremental

Lecture 28 - Introducing the Current Controlled Voltage Source

Lecture 29 - The Incremental Current Controlled Voltage Source Transimpedance Amplifier

Lecture 30 - The Transimpedance amplifier (Continued...)

Lecture 31 - The Incremental current controlled current source, the common gate amplifier

Lecture 32 - Summary of controlled Sources and finite output Impedance of the Transistor

Lecture 33 - Effect of Finite Output Resistance on the Basic Building Blocks - Part 1

Lecture 34 - Effect of Finite Output Resistance on the Basic Building Blocks - Part 2

Lecture 35 - Effect of Finite Output Resistance on the Basic Building Blocks - Part 3

Lecture 36 - Finite output Effect in current Mirrors the Cascode Current Mirror

Lecture 37 - Comparison of Current Mirrors The High Swing Cascode

Lecture 38 - Precision High Swing Cascode

Lecture 39 - The PMOS transistor

Lecture 40 - Small Signal Model and Bias Stabilization

Lecture 41 - Basic Building Blocks with PMOS Devices

Lecture 42 - Fixed Transconductance Bias Circuits from First Principles

Lecture 43 - Limitation of a Resistive Load

Lecture 44 - The Active Load

Lecture 45 - The Active Load (Continued...)

Lecture 46 - The CMOS Inverter

Lecture 47 - The CMOS Inverter (Continued...)

Lecture 48 - The Differential Amplifier

Lecture 49 - Half - Circuit Analysis

Lecture 50 - The Different Amplifier with Active Load - Part 1

Lecture 51 - The Different Amplifier with Active Load - Part 2

Lecture 52 - Large Signal Behaviour of the Different Pair

Lecture 53 - The two Stage Opamp and Single Supply Operation

Lecture 54 - The two Stage Opamp (Continued...)

Lecture 55 - The Two Stage Opamp (Continued...)

Lecture 56 - Swing Limits of the Two Stage OTA

Lecture 57 - The Two-Stage Opamp

Lecture 58 - The Bandgap Reference Principle

Lecture 59 - The Bandgap Reference - Part 1

Lecture 60 - The Bandgap Reference - Part 2

Lecture 61 - Memory Effects in MOS Transistors

Lecture 62 - The Common Source Amplifier with Parasitic Capacitances

Lecture 63 - The Common Source Amplifier with Parasitic Capacitances

Lecture 64 - Frequency Response of the Common Drain Amplifier

Lecture 65 - Frequency Response of the Common Gate Amplifier

Lecture 66 - Stability of Negative Feedback System The First Order Forward Amplifier

Lecture 67 - Stabilty of Second Order Feedback System

Lecture 68 - Stability of Third Order Negative Feedback System

Lecture 69 - Dominant Pole Compensation - Part 1

Lecture 70 - Dominant Pole Cpmpensation - Part 2

Lecture 71 - Phase Margin

Lecture 72 - Example Phase Margin Caculations

Lecture 73 - Dominant Pole Compensation Summary

Lecture 74 - Phase Margin Example

Lecture 75 - The 2 Stage Miller Compensated Amplifier

Lecture 76 - 2 Stage Operational Amplifier and Miller Compensation (Continued...)

Lecture 77 - Intuition Behind the Dominant and Second Poles in a Miller Compensated OTA

Lecture 78 - 2 Stage Operational Amplifier and Miller Compensation Cancelling the RHP Zero

Lecture 79 - Miller Compensation OTA Schematic

Lecture 80 - Bipolar Junction Transistor Circuits-Device Equations and Small Signal Model

Lecture 81 - BJT Biasing and Basic Building Blocks

Lecture 82 - Bipolar Junction Transistor Circuits Swing Limits and Two Stage Opamp

Lecture 83 - Input Stage of the 741 Opamp

Lecture 84 - Basic Analysis of the 741

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

Lecture 1 - Introduction to Optical Wireless Communications (OWC)

Lecture 2 - Basics of Lighting System

Lecture 3 - Optical Sources (LED)

Lecture 4 - Optical Sources (LASER)

Lecture 5 - Photodetecors

Lecture 6 - Photodetectors (Continued...)

Lecture 7 - SNR for PIN and APD

Lecture 8 - Indoor OWC channel modelling

Lecture 9 - Indoor OWC channel modelling (Continued...)

Lecture 10 - Channel model for single source

Lecture 11 - Channel model for multiple sources

Lecture 12 - MIMO channel

Lecture 13 - MIMO channel (Continued...)

Lecture 14 - Outdoor Optical Channel Modelling

Lecture 15 - Range equation of FSO link

Lecture 16 - Range equation of FSO link (Continued...)

Lecture 17 - Atmospheric Turbulence

Lecture 18 - Atmospheric Turbulence (Continued...)

Lecture 19 - Turbulence Mitigation techniques

Lecture 20 - Underwater OWC Channel Model

Lecture 21 - Underwater OWC Channel Model (Continued...)

Lecture 22 - Modulation Schemes for OWC, BER for OOK

Lecture 23 - BER of M-PPM, BER of L-PPM

Lecture 24 - Differential Pulse Interval Modulation (DPIM) and (DAPPM)

Lecture 25 - Variable Pulse Position Modulation (VPPM)

Lecture 26 - OFDM Basics

Lecture 27 - Cyclic Prefix (CP), OFDM with CP, BER of OFDM System

Lecture 28 - Frequency Offset in OFDM, PAPR in OFDM

Lecture 29 - OFDM in VLC, DCO-OFDM

Lecture 30 - ACO-OFDM

Lecture 31 - Color Shift Keying (CSK)

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:Advanced topics in Wireless Communication (Hindi) (Electrical Engineering)

Co-ordinators : Prof. Vivek Ashok Bohara

Lecture 1 - Overview of Advanced Topics in Wireless Communication System - Part A

Lecture 2 - Overview of Advanced Topics in Wireless Communication System - Part B

Lecture 3 - Revision of Wireless Fundamentals - Part A

Lecture 4 - Revision of Wireless Fundamentals - Part B

Lecture 5 - Revision of Wireless Fundamentals - Part C

Lecture 6 - Revision of Wireless Fundamentals - Part D

Lecture 7 - Revision of Wireless Fundamentals - Part E

Lecture 8 - Channel Capacity in AWGN channel

Lecture 9 - Channel Capacity in flat fading channel

Lecture 10 - Channel Capacity with Optimal Power Adaptation

Lecture 11 - Tutorial 1 - MATLAB Tutorial: Channel Capacity

Lecture 12 - Introduction to Channel Coding

Lecture 13 - Channel Coding: Uncoded and Coded Performnace

Lecture 14 - Introduction to Linear Block Codes

Lecture 15 - Tutorial 2 - MATLAB Tutorial: Linear Block Codes

Lecture 16 - Linear Block Codes: Error Detection

Lecture 17 - Linear Block Codes: Error Correction

Lecture 18 - Examples of Linear Block Codes

Lecture 19 - Introduction to Convolution Codes

Lecture 20 - Convolution Code: Decoder-Viterbi Algorithm

Lecture 21 - Tutorial 3 - MATLAB Tutorial: Syndrome Identification and Correction

Lecture 22 - Convolution Codes: State Diagram and Transfer Function

Lecture 23 - Turbo codes

Lecture 24 - Low Density Parity Check (LDPC) Codes: Encoding

Lecture 25 - Low Density Parity Check (LDPC) Codes: Decoding

Lecture 26 - Introduction to Polar Codes

Lecture 27 - Polar Codes: Encoding and Decoding

Lecture 28 - Introduciton to MIMO systems

Lecture 29 - Spatial Diversity Techniques

Lecture 30 - Introduction to Space Time Block Codes

Lecture 31 - Tutorial 4 - Convolution Codes: Hard and Soft Decoding

NPTEL : NOC:State Space Approach to Control System Analysis and Design (Electrical Engineering)

Co-ordinators : Prof A P Tiwari

NPTEL : NOC:Optimization Theory and Algorithms (Electrical Engineering)

Co-ordinators : Prof. Uday K Khankhoje

NPTEL : NOC:Power Electronics with Wide Band Gap Devices (Electrical Engineering)

Co-ordinators : Prof. Moumita Das

NPTEL : NOC:Optimal Control (Electrical Engineering)

Co-ordinators : Prof. Barjeev Tyagi

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. N P Padhy, Late 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 1 - Modeling of Power System Components

Lecture 2 - Modeling of Power System Components (Continued...)

Lecture 3 - Bus Admittance Matrix

Lecture 4 - Bus Admittance Matrix with Mutual Impedance

Lecture 5 - Bus Admittance Matrix with mutual impedance (Continued...)

Lecture 6 - Power flow equations and classification of buses

Lecture 7 - Basic Gauss - Seidel Numerical Method

Lecture 8 - Gauss - Seidel Load Flow (GSLF)

Lecture 9 - GSLF with Multiple Generators

Lecture 10 - Example of GSLF

Lecture 11 - Basics of Newton Raphson Numerical Method

Lecture 12 - Newton - Raphson Load Flow (NRLF) in Polar Co-Ordinate

Lecture 13 - NRLF in polar co-ordinate (Continued...)

Lecture 14 - NRLF in polar co-ordinate (Continued...)

Lecture 15 - NRLF (Polar) Algorithm and Example

Lecture 16 - NRLF in rectangular coordinate

Lecture 17 - NRLF in rectangular coordinate (Continued...)

Lecture 18 - NRLF in rectangular coordinate (Continued...)

Lecture 19 - Example of NRLF (Rectangular) Method

Lecture 20 - Fast decoupled load flow (FDLF)

Lecture 21 - FDLF (Continued...)

Lecture 22 - FDLF (Continued...)

Lecture 23 - AC- DC Load Flow

Lecture 24 - AC- DC Load Flow (Continued...)

Lecture 25 - AC- DC Load Flow (Continued...)

Lecture 26 - Sparsity and Gaussian Elimination

Lecture 27 - Gaussian Elimination Method

Lecture 28 - Example of Gaussian Elimination Method

Lecture 29 - Gaussian Elimination and Optimal Ordering

Lecture 30 - Triangular Factorization

Lecture 31 - LU Decomposition

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

Lecture 32 - Protection against Transients and Surges along with System Response to Severe Upsets - I

Lecture 33 - Protection against Transients and Surges along with System Response to Severe Upsets - II

Lecture 34 - Arc Interruption Theory in Circuit Breaker - I

Lecture 35 - Arc Interruption Theory in Circuit Breaker - II

Lecture 36 - Arc Interruption Theory in Circuit Breaker - III

Lecture 37 - Arc Interruption Theory in Circuit Breaker - IV

Lecture 38 - Types of Circuit Breakers

Lecture 39 - Testing, Commissioning and Maintenance of Relays - I

Lecture 40 - Testing, Commissioning and Maintenance of Relays - II

NPTEL : NOC:RF Transceiver of Design (Electrical Engineering)

Co-ordinators : Prof. Darshak Bhatt

Lecture 1 - Basic of Wireless Communication - I

Lecture 2 - Basic of Wireless Communication - II

Lecture 3 - Basic of Wireless Communication - III

Lecture 4 - Basic of Wireless Communication - IV

Lecture 5 - Basic of Wireless Communication - V

Lecture 6 - Basic of Wireless Communication - VI

Lecture 7 - Noise in RF Systems - I

Lecture 8 - Noise in RF Systems - II

Lecture 9 - Noise in RF Systems - III

Lecture 10 - Noise in RF Systems - IV

Lecture 11 - Non-Linearity in RF Systems - I

Lecture 12 - Non-Linearity in RF Systems - II

Lecture 13 - Non-Linearity in RF Systems - III

Lecture 14 - Transceiver Architecture - I

Lecture 15 - Transceiver Architecture - II

Lecture 16 - Transceiver Architecture - III

Lecture 17 - Transceiver Architecture - IV

Lecture 18 - Transceiver Architecture - V

Lecture 19 - Transceiver Architecture - VI

Lecture 20 - Transceiver Architecture - VII

Lecture 21 - Active Devices - I

Lecture 22 - Active Devices - II

Lecture 23 - Active Devices - III

Lecture 24 - Active Devices - IV

Lecture 25 - Passive Components and Impedance Matching - I

Lecture 26 - Passive Components and Impedance Matching - II

Lecture 27 - Passive Components and Impedance Matching - III

Lecture 28 - Passive Components and Impedance Matching - IV

Lecture 29 - Passive Components and Impedance Matching - V

Lecture 30 - Passive Components and Impedance Matching - VI

Lecture 31 - Passive Components and Impedance Matching - VII

Lecture 32 - Stability and Amplifier Design - I

Lecture 33 - Stability and Amplifier Design - II

Lecture 34 - Stability and Amplifier Design - III

Lecture 35 - Stability and Amplifier Design - IV

Lecture 36 - Low Noise Amplifier Design - I

Lecture 37 - Low Noise Amplifier Design - II

Lecture 38 - Low Noise Amplifier Design - III

Lecture 39 - Low Noise Amplifier Design - IV

Lecture 40 - Low Noise Amplifier Design - V

Lecture 41 - Low Noise Amplifier Design - VI

Lecture 42 - Mixer Design - I

Lecture 43 - Mixer Design - II

Lecture 44 - Mixer Design - III

Lecture 45 - Mixer Design - IV

Lecture 46 - Mixer Design - V

Lecture 47 - Mixer Design - VI

Lecture 48 - Mixer Design - VII

Lecture 49 - Mixer Design - VIII

Lecture 50 - Mixer Design - IX

Lecture 51 - Oscillator Design - I

Lecture 52 - Oscillator Design - II

Lecture 53 - Oscillator Design - III

Lecture 54 - Oscillator Design - IV

Lecture 55 - Power Amplifier Design - I

Lecture 56 - Power Amplifier Design - II

Lecture 57 - Power Amplifier Design - III

Lecture 58 - Basics of Phase Locked Loop - I

Lecture 59 - Basics of Phase Locked Loop - II

Lecture 60 - System Level Considerations

Lecture 61 - RF Testing and Measurement Techniques

NPTEL : NOC:VLSI Physical Design with Timing Analysis (Electrical Engineering)

Co-ordinators : Prof. Bishnu Prasad Das

Lecture 1 - Introduction to VLSI Design

Lecture 2 - Introduction to VLSI Physical Design

Lecture 3 - Complexity Analysis for Algorithms

Lecture 4 - Graphs for Physical Design

Lecture 5 - Graph searching Algorithms

Lecture 6 - Spanning Tree and Shortest Path Algorithms

Lecture 7 - Overview of Timing Analysis

Lecture 8 - Timing Arcs and Unateness

Lecture 9 - Delay Parameters of a Combinational Circuit

Lecture 10 - Delay Parameters of a Sequential Circuit

Lecture 11 - Timing Analysis in a Sequential Circuit

Lecture 12 - STA in Sequential Circuit with Clock Skew - I

Lecture 13 - STA in Sequential Circuit with Clock Skew - II

Lecture 14 - STA in Sequential Circuit with Clock Jitter

Lecture 15 - STA considering OCV and CRPR (Setup check)

Lecture 16 - STA considering OCV and CRPR (Hold check)

Lecture 17 - STA for Combinational Circuits - I

Lecture 18 - STA for Combinational Circuits - II

Lecture 19 - Introduction to Partitioning - I

Lecture 20 - Introduction to Partitioning - II

Lecture 21 - Partitioning Algorithms

Lecture 22 - Kernighan-Lin (KL) Algorithm

Lecture 23 - Fidduccia-Mattheyeses (FM) Algorithm

Lecture 24 - Introduction to Floorplanning

Lecture 25 - Floorplanning Representations

Lecture 26 - Floorplanning Algorithms - 1

Lecture 27 - Floorplanning Algorithms - 2

Lecture 28 - Pin Assignment and Power - Ground Routing

Lecture 29 - Introduction to Placement

Lecture 30 - Wirelength estimation techniques

Lecture 31 - Min-cut placement

NPTEL : NOC:Modeling, Analysis and Estimation of Three Phase Unbalanced Power Network (Electrical Engineering)

Co-ordinators : Prof. Biswarup Das

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

Co-ordinators : Prof. G.V. Mahesh

Lecture 31 - Conventional Vs HDI technologies; Flexible circuits; Tutorial session

Lecture 32 - SMD benefits; Design issues; Introduction to soldering

Lecture 33 - Reflow and Wave Soldering methods to attach SMDs

Lecture 34 - Solders; Wetting of solders; Flux and its properties; Defects in wave soldering

Lecture 35 - Vapour phase soldering, BGA soldering and Desoldering/Repair; SMT failures

Lecture 36 - SMT failure library and Tin Whiskers

Lecture 37 - Tin-lead and lead-free solders; Phase diagrams; Thermal profiles for reflow soldering; Lead-free alloys

Lecture 38 - Lead-free solder considerations; Green electronics; RoHS compliance and e-waste recycling issues

Lecture 39 - Thermal Design considerations in systems packaging

Lecture 40 - Introduction to embedded passives; Need for embedded passives; Design Library; Embedded resistor processes

Lecture 41 - Embedded capacitors; Processes for embedding capacitors; Case study examples; Summary of materials in packaging

Lecture 42 - Chapter-wise summary

NPTEL : Power Electronics and Distributed Generation (Electrical Engineering)

Co-ordinators : Dr. Vinod John

Lecture 32 - Thermal model, management and cycling failure of IGBT modules

Lecture 33 - Semiconductor switch design reliability considerations

Lecture 34 - AC filters for grid connected inverters

Lecture 35 - AC inductor design and need for LCL filter

Lecture 36 - LCL filter design

Lecture 37 - Examples in power electronic design for DG systems

Lecture 38 - Examples in power electronic design for DG systems continued

Lecture 39 - Higher order passive damping design for LCL filters

Lecture 40 - Balance of hardware component for inverters in DG systems

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

Co-ordinators : Dr. G. Narayanan

Lecture 1 - Electronic switches

Lecture 2 - DC - DC converters

Lecture 3 - DC - AC converters

Lecture 4 - Multilevel converters - I

Lecture 5 - Multilevel converters - II

Lecture 6 - Applications of voltage source converter - I

Lecture 7 - Applications of voltage source converter - II

Lecture 8 - Applications of voltage source converter - III

Lecture 9 - Purpose of PWM - I

Lecture 10 - Purpose of PWM - II

Lecture 11 - Low switching frequency PWM - I

Lecture 12 - Low switching frequency PWM - II

Lecture 13 - Selective harmonic elimination

Lecture 14 - Off-line optimized pulsewidth modulation

Lecture 15 - Sine-triangle pulsewidth modulation

Lecture 16 - Harmonic injection pulsewidth modulation

Lecture 17 - Bus-clamping pulsewidth modulation

Lecture 18 - Triangle-comparison based PWM for three-phase inverter

Lecture 19 - Concept of space vector

Lecture 20 - Conventional space vector PWM

Lecture 21 - Space vector based bus-clamping PWM

Lecture 22 - Space vector based advanced bus-clamping PWM

Lecture 23 - Harmonic analysis of PWM techniques

Lecture 24 - Analysis of RMS line current ripple using the notion of stator flux ripple

Lecture 25 - Evaluation of RMS line current ripple using the notion of stator flux ripple

Lecture 26 - Analysis and design of PWM techniques from line current ripple perspective

Lecture 27 - Instantaneous and average dc link current in a voltage source inverter

Lecture 28 - DC link current and DC capacitor current in a voltage source inverter

Lecture 29 - Analysis of torque ripple in induction motor drives - I

Lecture 30 - Analysis of torque ripple in induction motor drives - II

Lecture 31 - Evaluation of conduction loss in three-phase inverter

NPTEL : Switched Mode Power Conversion (Electrical Engineering)

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

Lecture 1 - Introduction to DC-DC converter

Lecture 2 - Diode

Lecture 3 - Controlled Switches

Lecture 4 - Prior Art

Lecture 5 - Inductor

Lecture 6 - Transformer

Lecture 7 - Capacitor

Lecture 8 - Issues related to switches

Lecture 9 - Energy storage - Capacitor

Lecture 10 - Energy storage - Inductor

Lecture 11 - Primitive Converter

Lecture 12 - Non-Isolated converter - I

Lecture 13 - Non-Isolated converter - II

Lecture 14 - Isolated Converters - I

Lecture 15 - Isolated Converters - II

Lecture 16 - Conduction Mode

Lecture 17 - Problem set - I

Lecture 18 - Problem set - II

Lecture 19 - Modeling DC-DC converters

Lecture 20 - State space representation - I

Lecture 21 - State Space representation - II

Lecture 22 - Circuit Averaging - I

Lecture 23 - Circuit Averaging - II

Lecture 24 - State Space Model of Boost Converter

Lecture 25 - DC-DC converter controller

Lecture 26 - Controller Structure

Lecture 27 - PID Controller - I

Lecture 28 - PID Controller - II

Lecture 29 - PID Controller - III

Lecture 30 - Implementation of PID controller

Lecture 31 - Pulse Width Modulator

NPTEL : Basic Electrical Technology (Electrical Engineering)

Co-ordinators : Prof. L. Umanand

Lecture 1 - Basic Electrical Technology

Lecture 2 - Passive Components

Lecture 3 - Sources

Lecture 4 - Kirchoff's Law

Lecture 5 - Modelling of Circuit - Part 1

Lecture 6 - Modelling of Circuit - Part 2

Lecture 7 - Analysis Using MatLab

Lecture 8 - Sinusoidal steady state

Lecture 9 - Transfer Function and Pole Zero domain

Lecture 10 - Transfer function & pole zero

Lecture 11 - The Sinusoid

Lecture 12 - Phasor Analysis - Part 1

Lecture 13 - Phasor Analysis - Part 2

Lecture 14 - Power Factor

Lecture 15 - Power ports

Lecture 16 - Transformer Basics - Part 1

Lecture 17 - Transformer Basics - Part 2

Lecture 18 - Transformer Basics - Part 3

Lecture 19 - The Practical Transformer - Part 1

Lecture 20 - The Practical Transformer - Part 2

Lecture 21 - The Practical Transformer - Part 3

Lecture 22 - DC Machines - Part 1

Lecture 23 - DC Machines - Part 2

Lecture 24 - DC Generators - Part 1

Lecture 25 - DC Generators - Part 2

Lecture 26 - DC Motors - Part 1

Lecture 27 - DC Motors - Part 2

Lecture 28 - DC Motors - Part 3

Lecture 29 - Three Phase System - Part 1

Lecture 30 - Three Phase System - Part 2

Lecture 31 - Three Phase System - Part 3

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

Lecture 1 - Introduction to IOTs - Part I

Lecture 2 - Introduction to IOTs - Part II

Lecture 3 - Introduction to IOTs - Examples

Lecture 4 - IOT applications - I

Lecture 5 - IOT applications - II

Lecture 6 - Power management in IOT device

Lecture 7 - Introduction to LDO

Lecture 8 - Design with an LDO

Lecture 9 - Introduction to switching regulators

Lecture 10 - Designing with LDO's, switching regulators and case studies - Part I

Lecture 11 - Designing with LDO's, switching regulators and case studies - Part II

Lecture 12 - Designing with LDO's, switching regulators and case studies - Part II

Lecture 13 - Designing with LDO's, switching regulators and case studies - Part IV

Lecture 14 - Power Conditioning with Energy Harvesters - I

Lecture 15 - Power Conditioning with Energy Harvesters - II

Lecture 16 - Power Conditioning with Energy Harvesters - III

Lecture 17 - Battery less power supply and battery life calculation for embedded devices - I

Lecture 18 - Battery less power supply and battery life calculation for embedded devices - II

Lecture 19 - Battery less power supply and battery life calculation for embedded devices - III

Lecture 20 - Introduction to MQTT

Lecture 21 - Quality of Service in MQTT

Lecture 22 - Standards and Security in MQTT

Lecture 23 - Introduction and Implementation of AMQP

Lecture 24 - Implementation of CoAP and MDNS

Lecture 25 - Basics of RFID

Lecture 26 - RFID protocol and applications

Lecture 27 - BLE Security

Lecture 28 - LPWAN technologies

Lecture 29 - Choice of Microcontrollers

Lecture 30 - Case Study 1 - Joule Jotter

Lecture 31 - Case Study 2 - Cloud Based Systems

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

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

Lecture 30 - Problem on MAP Detection

Lecture 31 - Fourier transform of dirac comb sequence

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

Co-ordinators : Prof. N. V Chalapathi Rao

Lecture 1 - Electronic Equipment Thermal issues

Lecture 2 - Practical Examples - 1

Lecture 3 - Practical Examples - 2

Lecture 4 - CEDT worked examples - 1

Lecture 5 - CEDT worked examples - 2

Lecture 6 - Text book theory

Lecture 7 - Sample heat sinks

Lecture 8 - Published correlations - 1

Lecture 9 - Published correlations - 2

Lecture 10 - Parallel combined effects

Lecture 11 - Mounting of packages

Lecture 12 - Combined Rth of devices

Lecture 13 - Schonholzer moduls

Lecture 14 - 1972 model paper

Lecture 15 - Jensen model

Lecture 16 - Thermal management - 1

Lecture 17 - Thermal management - 2

Lecture 18 - Round up of full model

Lecture 19 - Fan cooling

Lecture 20 - Thermo-electric cooling

Lecture 21 - On-the-net DIY work

Lecture 22 - Practical video

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27 - Real packages

Lecture 28 - Prior art

Lecture 29 - OTS standard profiles

Lecture 30 - CAD detailed design of profiles

Lecture 31 - Round up

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

Lecture 32 - Smart Catheter: Flexible Force Sensor (Continued...)

Lecture 33 - Tissue and Cell Culture Techniques

Lecture 34 - Clean Room: Equipments Required

Lecture 35 - GLP: Gowning Procedure for using Lab

Lecture 36 - Introduction to Equipments: Refridgerator

Lecture 37 - Gowning Procedure for using Biological Lab Setup

Lecture 38 - Introduction to Equipments: Desiccator

Lecture 39 - Introduction to Equipments: Impedance Analyzer

Lecture 40 - Introduction to Equipments: DAQ

Lecture 41 - Function generator, Multimeter, Sampling, LabVIEW, NI-CDAQ

Lecture 42 - Introduction to Equipments: Stereo Microscope

Lecture 43 - Introduction to Equipments: Metallurgical Microscope

Lecture 44 - Introduction to Equipments: Inverted Microscope

Lecture 45 - Introduction to Equipments: Fire Alarm

Lecture 46 - Introduction to Equipments: Bio-safety Hood

Lecture 47 - Introduction to Equipments: Peristaltic Pump

Lecture 48 - Introduction to Equipments: Incubator

Lecture 49 - Introduction to Equipments: Oven

Lecture 50 - Introduction to Equipments: Micromanipulator

Lecture 51 - PDMS Moulding

Lecture 52 - 3D Printing

Lecture 53 - Introduction to Fabricated Sensors

Lecture 54 - Simulation: Electro- Thermo- Mechanical Properties of Micro-heater using COMSOL Multiphysics

Lecture 55 - Simulation: Electro- Thermo- Mechanical Properties of Micro-heater using COMSOL Multiphysics (Continued...)

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

Lecture 32 - Air quality : pollutants and standards

Lecture 33 - Introduction to air quality sensors

Lecture 34 - Calibration techniques for IoT air quality sensors

Lecture 35 - Sensor types : semiconductor and electrochemical

Lecture 36 - Air quality : Overview of system design

Lecture 37 - Air quality : System design - Part 1

Lecture 38 - Air quality : System design - Part 2

Lecture 39 - Air quality : Real time measurement for a drive cycle

Lecture 40 - Introduction to First Responder networks

Lecture 41 - First Responders - Applications - Part 1

Lecture 42 - First Responders - Applications - Part 2

Lecture 43 - Cargo monitoring for tamper detection - Part 1

Lecture 44 - Cargo monitoring for tamper detection - Part 2

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

Co-ordinators : Prof. Hardik Jeetendra Pandya

Lecture 1 - Tissue and Cell Culture Techniques: Introduction

Lecture 2 - Tissue and Cell Culture Techniques: Methods

Lecture 3 - Tissue and Cell Culture Techniques: Devices

Lecture 4 - Cleanroom Equipments

Lecture 5 - Cleanroom Equipments (Continued...)

Lecture 6 - Introduction to photolithography

Lecture 7 - Photolithography: Mask Aligner

Lecture 8 - Photolithography: Designing Mask Aligner

Lecture 9 - Micromachining Techniques

Lecture 10 - Breast Cancer and Oral Cancer Statistics

Lecture 11 - Fabrication of MEMs-based Biochip for cancer diagnosis

Lecture 12 - Fabrication of MEMs-based Biochip for cancer diagnosis (Continued...)

Lecture 13 - Fabrication of Piezoresistive Sensor

Lecture 14 - Fabrication of Piezoresistive Sensor (Continued...)

Lecture 15 - Fabrication of SU-8 pillar on piezoresistive Sensor

Lecture 16 - Portable Cancer Diagnostic Tool Using a Disposable MEMS-Based Biochip

Lecture 17 - Mechanical Phenotyping of Breast Cancer using MEMS

Lecture 18 - Electrical characterization of Breast Tissue Cores

Lecture 19 - Fabrication of MEMS-based sensor for electro-mechanical phenotyping of breast cancer

Lecture 20 - Fabrication of electro-mechanical sensor (Continued...)

Lecture 21 - Assemby of the electro-mechanical sensor

Lecture 22 - Silicon substrate devices for breast cancer diagnosis

Lecture 23 - Understanding the methods and mechanism to study cell morphology

Lecture 24 - Cytology - A detail study on Spin Coater and Cytospin

Lecture 25 - Techniques in oral cytology studies

Lecture 26 - Techniques in cell morphology analysis

Lecture 27 - Comparitive study on diagnostic tools for oral cancer screening

Lecture 28 - Basic building blocks of Electronics System: Amplifiers

Lecture 29 - Basic building blocks of Electronics System: Amplifiers (Continued...)

Lecture 30 - Basic building blocks of Electronics System: Amplifiers (Continued...)

Lecture 31 - Basic building blocks of Electronics System: Filters

Lecture 32 - Basic building blocks of Electronics System: Filters (Continued...)

Lecture 33 - Basic building blocks of Electronics System: Filters (Continued...)

Lecture 34 - Basic building blocks of Electronics System: Data Converteres

Lecture 35 - Basic building blocks of Electronics System: Data Converteres (Continued...)

Lecture 36 - Basic building blocks of Electronics System: Signal Conditioning Circuits

Lecture 37 - Etching Process and Figure of Merits

Lecture 38 - ECG Signal Processing to calculate BPM

Lecture 39 - ECG Signal Processing to calculate BPM (Continued...)

Lecture 40 - ECG Signal Processing to calculate BPM (Continued...)

Lecture 41 - ECG Signal Processing to calculate BPM (Continued...)

Lecture 42 - ECG Signal Processing to calculate BPM (Continued...)

Lecture 43 - ECG Signal Processing to calculate BPM [Continued...)

Lecture 44 - MEMS based Force Sensor for Catheter Contact Force Measurement

Lecture 45 - 3D Printing: Introduction and Work Flow

Lecture 46 - 3D Fabrication Techniques

Lecture 47 - Gowning Procedure in Clean Room

Lecture 48 - Introduction to Equipments: Desiccators

Lecture 49 - PDMS Moulding procedure

Lecture 50 - Introduction to Equipments: Pristaltic Pump

Lecture 51 - Introduction to Equipments: Stereo Microscopy, Metallurgical Microscopy, Inverted Microscopy

Lecture 52 - Micromanipulator

Lecture 53 - Biosafety Cabinet and Ultrasonicbath

Lecture 54 - Incubator Shaker

Lecture 55 - Hotplate and Microcentrifuge

Lecture 56 - Autoclave

Lecture 57 - Impedance Analyser

Lecture 58 - Rapid Prototyping using 3D Printer

Lecture 59 - Etching Process

Lecture 60 - Electronic System for Drug Screening

Lecture 61 - Introduction to Equipments: DAQ

Lecture 62 - Introduction to Equipments: DAQ (Continued...)

Lecture 63 - Electronic Module for Gas sensor

Lecture 64 - Fabrication process flow for a metal oxide gas sensor

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 1 - Sensors - Part 1

Lecture 2 - Sensors - Part 2

Lecture 3 - Sensors - Part 3

Lecture 4 - Sensors - Part 4

Lecture 5 - Sensors - Part 5

Lecture 6 - Recent Microsensors based system: E-Nose

Lecture 7 - Recent Microsensors based system: Force Sensor, Basics of Actuators

Lecture 8 - Microfabrication Basics

Lecture 9 - Introduction to cleanroom

Lecture 10 - Cleanroom Protocols

Lecture 11 - Introduction to Cleanroom Equipments: Micromanipulator, Stereo Microscope, metallurgical microscope, Incubator, Static Incubator, Inverted Microscope, Oven, Autoclave, Sonicator

Lecture 12 - Fabrication Process Flow of Microheater and Micromachining

Lecture 13 - Wafer Bonding and PDMS moulding

Lecture 14 - Overview of MEMS based sensors

Lecture 15 - Introduction to Cleanroom Equipments: Impedance Analyzer, LCR Meter, Micromanipulator

Lecture 16 - Introduction to Cleanroom Equipments: Biosafety Hood and safety

Lecture 17 - Process Sensor Process Flow, Cell based Diagnosis Device

Lecture 18 - Basics of Patterning and Drug Screening Device

Lecture 19 - MEMS applications in automobile system

Lecture 20 - Arduino Interfacing for Sensors and Actuators

Lecture 21 - Demonstration of DC Motor as an actuator

Lecture 22 - Demonstration of peristaltic pump using Arduino

Lecture 23 - Demonstration of PDMS Patterning

Lecture 24 - Crystal Orientation and Si-SiO2 interface

Lecture 25 - Surface Profilometry and Physical Vapour Deposition Techniques

Lecture 26 - Introduction to COMSOL Multiphysics and Modelling Examples

Lecture 27 - Demonstration of Thermal Actuators using COMSOL

Lecture 28 - Demonstration of MQ3 Gas sensor using Arduino

Lecture 29 - Photolithography - Part 1

Lecture 30 - Signal Conditioning Circuit for Temperature Sensors

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

Co-ordinators : Prof. Shayan Srinivasa Garani

Lecture 32 - Optimization with equality constraint

Lecture 33 - Optimization with inequality constraint

Lecture 34 - Support Vector Machines (SVM)

Lecture 35 - Optimal hyperplane for linearly separable patterns

Lecture 36 - Quadratic optimization for finding optimal hyperplane

Lecture 37 - Optimal hyperplane for non-linearly separable patterns

Lecture 38 - Inner product kernel and Mercerâ€™s theorem

Lecture 39 - Optimal design of an SVM

Lecture 40 - Îµ-insensitive loss function

Lecture 41 - XOR problem revisited using SVMs

Lecture 42 - Hilbert Space

Lecture 43 - Reproducing Kernel Hilbert Space

Lecture 44 - Representer Theorem

Lecture 45 - Generalized applicability of the representer theorem

Lecture 46 - Regularization Theory

Lecture 47 - Euler-Lagrange Equation

Lecture 48 - Regularization Networks

Lecture 49 - Generalized RBF networks

Lecture 50 - XOR problem revisited using RBF

Lecture 51 - Structural Risk Minimization

Lecture 52 - Bias-Variance Dilemma

Lecture 53 - Estimation of regularization parameters

Lecture 54 - Basics of L1 regularization

Lecture 55 - Grafting

Lecture 56 - Kernel PCA

Lecture 57 - Hebbian based maximum eigen filter - 1

Lecture 58 - Hebbian based maximum eigen filter - 2

Lecture 59 - Hebbian based maximum eigen filter - 3

Lecture 60 - VC dimension

Lecture 61 - Autoencoders

Lecture 62 - Denoising Autoencoders

Lecture 63 - Demo - Perceptron

Lecture 64 - Demo - Motivation for CNN

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

Lecture 1 - Getting started with NgSpice

Lecture 2 - Refractoring the .cir

Lecture 3 - Sub-circuits

Lecture 4 - gschem and netlist generation

Lecture 5 - Setting up for simulation with Octave

Lecture 6 - Getting started with equation based simulation

Lecture 7 - Resuming a simulation in Octave

Lecture 8 - PV cell model - review

Lecture 9 - PV cell characteristic - review

Lecture 10 - PV cell - symbol and subcircuit

Lecture 11 - Rectifier-capacitor filter - operation review

Lecture 12 - Rectifier-capacitor filter - NgSpice simulation

Lecture 13 - Rectifier-capacitor filter with non-idealities

Lecture 14 - 3 phase Rectifier-capacitor filter

Lecture 15 - Equation based simulation in Octave

Lecture 16 - Passive power factor improvement - review

Lecture 17 - Passive power factor circuit in NgSpice

Lecture 18 - Buck converter - review

Lecture 19 - Buck converter - NgSpice

Lecture 20 - Boost converter - review

Lecture 21 - Boost converter - NgSpice

Lecture 22 - Buck-boost converter - review

Lecture 23 - Buck-boost converter - NgSpice

Lecture 24 - Equation based simulation of converters

Lecture 25 - Forward Converter - review

Lecture 26 - Forward Converter simulation

Lecture 27 - Understanding Core flux reset

Lecture 28 - Core flux reset - simulation

Lecture 29 - Flyback converter - review

Lecture 30 - Flyback converter - simulation

Lecture 31 - Pushpull converter - review

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

Co-ordinators : Prof. Mahesh Jayachandra

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

Lecture 1 - Introduction and Definition of IoT

Lecture 2 - Location, Applications, and Power

Lecture 3 - Challenges - Part 1

Lecture 4 - Challenges - Part 2

Lecture 5 - Challenges - Part 3

Lecture 6 - Challenges - Part 4

Lecture 7 - Unique ID

Lecture 8 - Introduction to RFID

Lecture 9 - RFID DEMO

Lecture 10 - RFID Theory - 1

Lecture 11 - RFID Theory - 2

Lecture 12 - RFID Theory - 3

Lecture 13 - Energy harvesting - 1

Lecture 14 - Energy harvesting - 2

Lecture 15 - Energy harvesting - 3

Lecture 16 - Power management systems - 1

Lecture 17 - Power management systems - 2

Lecture 18 - Battery life calculation

Lecture 19 - Introduction to System Design for low power

Lecture 20 - LDO - 1

Lecture 21 - LDO - 2

Lecture 22 - LDO - 3

Lecture 23 - Buck converter - 1

Lecture 24 - Buck converter - 2

Lecture 25 - Lab experiment

Lecture 26 - Introduction to Sensors and Actuators

Lecture 27 - Sensors

Lecture 28 - Actuators

Lecture 29 - Case study on Sensing and Actuation

Lecture 30 - Introduction to low power software

Lecture 31 - ADC driver design and development

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

Lecture 32 - Lab 9 - 3D Printing for neural devices

Lecture 33 - Introduction to Biopotentials

Lecture 34 - EEG: Introduction, Demonstration and Applications

Lecture 35 - Neural Implants: Fabrication and Characterization

Lecture 36 - Design of Wireless Biphasic Pulse Generator

Lecture 37 - Basics of EEG/ERP Experimental Desing

Lecture 38 - Micromachining and Etching

Lecture 39 - Epileptic Seizure Detection and Classification

Lecture 40 - Newborn Hearing Screening - I

Lecture 41 - Newborn Hearing Screening - II

Lecture 42 - Applications of EEG/ERP Experimental Design

Lecture 43 - Flexible MEA for Electrocorticography Signal Acquisition

Lecture 44 - Flexible biodegradable MEAs

Lecture 45 - Microneedle Electrode Array

Lecture 46 - Neurosurgery-based MEA Implantation - I

Lecture 47 - Neurosurgery-based MEA Implantation - II

Lecture 48 - Neurosurgery-based MEA Implantation - III

Lecture 49 - Neurosurgery-based MEA Implantation - IV

Lecture 50 - Deep Brain Stimulation/Recording for Parkinson's - I

Lecture 51 - Deep Brain Stimulation/Recording for Parkinson's - II

Lecture 52 - Computational Neuroscience Fundamentals

Lecture 53 - Mathematical Analysis in Neural Science

Lecture 54 - Neuroanatomy for Neural Engineering

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

Co-ordinators : Dr. Prathap Reddy

Lecture 1 - History Prospect of Electrical Machines

Lecture 2 - Electric Fields

Lecture 3 - Magnetic Fields - 1

Lecture 4 - Magnetic Fields - 2

Lecture 5 - Electric and Magnetic Circuits Interface

Lecture 6 - Magnetic Materials and Concepts of BH Curves

Lecture 7 - Analysis of Magnetic Circuits With and Without Air Gaps

Lecture 8 - Example Problems of Magnetic Circuits

Lecture 9 - Magnetic Circuits with Multiple Windings and Permanent Magnets

Lecture 10 - Force Equations in Electromechanical Systems - 1

Lecture 11 - Force Equations in Electromechanical Systems - 2

Lecture 12 - Design of Electromagnetic Systems

Lecture 13 - Realization of Electrical Machines - 1

Lecture 14 - Realization of Electrical Machines - 2

Lecture 15 - Magnetic Fields in DC Machines - 1

Lecture 16 - Magnetic Fields in AC Machines - 1

Lecture 17 - Magnetic Fields in AC Machines - 2

Lecture 18 - Magnetic Fields in AC Machines - 3

Lecture 19 - MMFDistribution ofAC Machines

Lecture 20 - Basics of Electrical Machine Windings

Lecture 21 - Stator winding design-single layer winding

Lecture 22 - Stator winding design-double layer winding

Lecture 23 - Stator Winding Design-Fractional Slot Double Layer Winding

Lecture 24 - Variable Pole Machine Stator Winding Design (Pole-Phase Modulation) - 1

Lecture 25 - Variable Pole Machine Stator Winding Design (Pole-Phase Modulation) - 2

Lecture 26 - Importance of Motor Design and Standards of Electric Motors

Lecture 27 - Electric Machine Sizing Equations-Output Power and Volume (D2L) Product Equation

Lecture 28 - Lab Session on Re-winding of Induction Motor (Example: Double Layer Winding)

Lecture 29 - The Figure of Merits for Electric Motors and Aspect Ratio to Decouple the D2L Product

Lecture 30 - Electric Machine Sizing Equations-Output Power Equation in terms of D3L Product - 1

Lecture 31 - Electric Machine Sizing Equations-Output Power Equation in terms of D3L Product - 2

NPTEL : NOC:Basics of Semiconductor Microwave Devices (Electrical Engineering)

Co-ordinators : Prof Digbijoy N Nath