NPTEL Video Course - Electrical Engineering - NOC:Fundamental of Power Electronics

Subject Co-ordinator - Prof. Vivek Agarwal

Co-ordinating Institute - IIT - Bombay

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

Lecture 1 - Familiarization with Power Electronic Systems
Lecture 2 - Overview of Basic Power Electronic Circuits from Laymans Point of View
Lecture 3 - Applications, Definitions, and Nature of Power Electronic Circuits
Lecture 4 - Components of a Power Electronic System
Lecture 5 - Analysis of Switched Networks
Lecture 6 - Review of engineering maths for power electronic circuit analysis
Lecture 7 - Review of semiconductor physics
Lecture 8 - P-N Junction
Lecture 9 - Power Diodes
Lecture 10 - Thyristors
Lecture 11 - Motivation for rectifier capacitor filter
Lecture 12 - Circuit Operation
Lecture 13 - Designing the circuit
Lecture 14 - Simulation setup for NgSpice and gEDA schematic capture
Lecture 15 - Simulating the circuit
Lecture 16 - Practicals
Lecture 17 - Inrush current limiting - Intro
Lecture 18 - Inrush current limiting - Resistor solution
Lecture 19 - Inrush current limiting - Thermistor solution
Lecture 20 - Inrush current limiting - Transformer solution
Lecture 21 - Inrush current limiting - MOSFET solution
Lecture 22 - Inrush current limiting - Relay, contactor
Lecture 23 - Three phase rectifier capacitor filter
Lecture 24 - Simulation - 3 phase rectifier capacitor filter
Lecture 25 - Power factor - Motivation
Lecture 26 - Power factor - Discussion
Lecture 27 - Power factor - Sinusoidal
Lecture 28 - Power factor for rectifier cap filter
Lecture 29 - Passive power improvement circuit

Lecture 30 - Simulation - power factor improvement
Lecture 31 - Linear regulators - Intro
Lecture 32 - Shunt regulator
Lecture 33 - Example on shunt regulator
Lecture 34 - Non-ideality and solution
Lecture 35 - Applications of shunt regulator
Lecture 36 - Series regulator
Lecture 37 - Efficiency of series
Lecture 38 - Negative and dual voltage regulators
Lecture 39 - Over current limiting circuits
Lecture 40 - Improvements to series regulator
Lecture 41 - Regulator performance parameters
Lecture 42 - Datasheet of few IC regulators
Lecture 43 - Common IC regulator circuits
Lecture 44 - Practicals 1
Lecture 45 - Switched mode DC-DC converter intro
Lecture 46 - Volt-sec and Amp-sec balance
Lecture 47 - Input-output relationship
Lecture 48 - Buck converter - operation and waveforms
Lecture 49 - Buck converter - component selection
Lecture 50 - Primary configurations
Lecture 51 - Boost converter
Lecture 52 - Buck-Boost converter
Lecture 53 - Simulating the primary converters
Lecture 54 - Forward converter
Lecture 55 - Core reset in forward converter
Lecture 56 - Simulating with lossy core reset
Lecture 57 - Simulating with lossless core reset
Lecture 58 - Flyback converter
Lecture 59 - Simulating the flyback converter
Lecture 60 - Octave mfile for design
Lecture 61 - Magnetics design intro
Lecture 62 - Magnetics review
Lecture 63 - Permeance
Lecture 64 - Inductor value and energy storage
Lecture 65 - Inductor area product
Lecture 66 - Inductor design
Lecture 67 - Inductor example
Lecture 68 - Transformer design

Lecture 69 - Transformer example
Lecture 70 - Forward converter design mfile
Lecture 71 - Pushpull converter
Lecture 72 - Flux walking in pushpull
Lecture 73 - PWM generation
Lecture 74 - Simulation of pushpull converter
Lecture 75 - Half bridge converter
Lecture 76 - Simulation of halfbridge converter
Lecture 77 - Full bridge converter
Lecture 78 - Simulation of fullbridge converter
Lecture 79 - Area products and mfiles
Lecture 80 - Intro for drive circuits
Lecture 81 - BJT base drive
Lecture 82 - BJT base drive example
Lecture 83 - Multi-stage base drive
Lecture 84 - Base drive with speed-up circuit
Lecture 85 - Base drive with isolation
Lecture 86 - MOSFET gate drive
Lecture 87 - MOSFET drive with isolation
Lecture 88 - Over-current protection
Lecture 89 - Snubber circuits
Lecture 90 - Intro for close loop control
Lecture 91 - Close looping dc-dc converters
Lecture 92 - Simulation of close loop control
Lecture 93 - Current control for battery charger application
Lecture 94 - Instability in current control and slope compensation
Lecture 95 - Slope compensated current control
Lecture 96 - Simulation of current control
Lecture 97 - Single phase inverter with sinusoidal pwm
Lecture 98 - Simulation of sinusoidal PWM