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<tr>
<td><strong>1.</strong></td>
<td>SIGNALS &amp; NETWORKS</td>
<td>(Web) <a href="http://nptel.ac.in/courses/117101055/">http://nptel.ac.in/courses/117101055/</a></td>
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<td><strong>2.</strong></td>
<td>ELECTRICAL MACHINES-I</td>
<td>(Web) <a href="http://nptel.ac.in/courses/108106071/">http://nptel.ac.in/courses/108106071/</a></td>
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<td><strong>3.</strong></td>
<td>ELECTRICAL MACHINES-II</td>
<td>(Web) <a href="http://nptel.ac.in/courses/108106072/">http://nptel.ac.in/courses/108106072/</a></td>
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4. **POWER ELECTRONICS**

(Web) [http://nptel.ac.in/courses/108105066/](http://nptel.ac.in/courses/108105066/)

(video) [http://nptel.ac.in/courses/108101038/](http://nptel.ac.in/courses/108101038/)

5. **ELECTRIC DRIVES**
   Factors affecting selection of drives, speed-torque characteristics of motors and loads, condition of steady-state stability, transient stability: equal area criterion, dynamics of motor load combination, DC shunt motor and series motor braking methods and speed-torque characteristics in four quadrants, Induction motor: steady-state performance analysis, braking methods, four quadrant speed-torque characteristics, dc and ac dynamic braking. Methods of starting, energy relations during starting and braking. Transients in dc and ac drives; Motor and converter performance parameters, 1-phase full- and semi- converter fed dc shunt and dc series motor, Mathematical analysis of 1-phase converter fed dc motors, 1-phase Dual converter: waveforms, operations with and without circulating current, 3-phase full converter, semi converter and dual converter fed dc drives, Power factor considerations of semi- and full converters, Power factor improvement of phase controlled converters, Sequence control of converters, Chopper controlled dc drives; Static speed control of induction motor: stator voltage control, Static control of rotor resistance, Static slip power recovery scheme, VSI and cyclo-converter fed drives, V/f control, constant torque and constant power operations, closed loop V/f control, CSI Fed drives; Induction motor behaviour with non-sinusoidal supply and unbalanced supply, PWM inverters and reduction of harmonics, Synchronous motor drives: true and self-synchronous modes, hunting; Brushless dc motor drive, Reluctance motor, SRM, stepper motors; Illumination, electrical heating, furnaces, arc welding, industrial application of motors in steel mills, textile mills, cement mill and paper mills; Electric traction services, nature of traction load, main line and sub-urban train configuration, traction mechanics, traction drives, braking, power factor and harmonics, traction motor.

(Web) [http://nptel.ac.in/courses/108102046/](http://nptel.ac.in/courses/108102046/)

(video) [http://nptel.ac.in/courses/108108077/](http://nptel.ac.in/courses/108108077/)

[http://nptel.ac.in/courses/108104011/](http://nptel.ac.in/courses/108104011/)

[http://nptel.ac.in/courses/108108077/](http://nptel.ac.in/courses/108108077/)

6. **ANALOG ELECTRONICS**
   Scope and applications of analog electronic circuits, Amplifier models: Voltage amplifier, Current amplifier, (Web) [http://nptel.ac.in/courses/117107095/](http://nptel.ac.in/courses/117107095/)
transconductance amplifier and transresistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CQ, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers. High frequency transistor models, frequency response of single stage and multistage amplifiers, various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues. Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.). Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and PSRR. OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages, compensation. OPAMP applications: review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, non-sinusoidal oscillators, Schmitt trigger and its applications. Active filters: Low pass, high pass, bandpass and bandstop, design guidelines. Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, resistor string etc. Analog-to-digital converters (ADC): Single slope, dual slope, successive approximation, etc.
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<td><strong>ELECTRICAL MEASUREMENT AND INSTRUMENTATION</strong></td>
<td>(Web) <a href="http://nptel.ac.in/courses/108105053/42">http://nptel.ac.in/courses/108105053/42</a></td>
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<td>2.</td>
<td><strong>POWER SYSTEM OPERATION AND CONTROL</strong></td>
<td>(Web) <a href="http://nptel.ac.in/courses/108105067/">http://nptel.ac.in/courses/108105067/</a></td>
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<tr>
<td>3.</td>
<td><strong>DIGITAL ELECTRONICS</strong></td>
<td>(Web) <a href="http://nptel.ac.in/courses/117105140/">http://nptel.ac.in/courses/117105140/</a></td>
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**Logic Gates, Negative Logic System, Standard Chips, Programmable Logic Devices, Custom Chips, Standard Cells and Gate Arrays Practical Aspects, Transmission Gates.**

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<th>4. MICROPROCESSORS &amp; EMBEDDED SYSTEMS</th>
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| Overview of Embedded System and Design; The 8085 Microprocessor: Architecture & Programming; Microprocessor Peripheral Interface Controller & I/O interfaces: Memory Interface, Parallel Interfaces for Signal Acquisition, User Interface (Keyboard & Displays), Serial Communication Protocol & Interface, Programmable Interval Timer, Programmable Interrupt Controller, Direct Memory Access; The 8086 Microprocessor: Architecture & Programming; 8051 Microcontroller: Architecture & Programming; Microcontroller Peripheral Interfacing: Real-time Operating System, Parallel Interface for Signal Acquisition, User Interface (Keyboard & Displays), Design with Low Pin Count, Serial Communication Protocol & Interface, External Memory Interface; Application of Embedded Systems and Simulation. | (Web) http://nptel.ac.in/courses/108107029/  
http://nptel.ac.in/courses/106108100/  
http://nptel.ac.in/courses/108105057/  
http://nptel.ac.in/courses/106108100/  
(Video) http://nptel.ac.in/courses/108105102/  
http://nptel.ac.in/courses/108102045/  
http://nptel.ac.in/courses/106105159/ |

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<th>5. PRINCIPLES OF CONTROL SYSTEMS ENGINEERING</th>
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(Video) http://nptel.ac.in/courses/108101037/  
http://nptel.ac.in/courses/108106098/  
http://nptel.ac.in/courses/108102043/ |
Steady state response steady state error, The generalized error analysis, Stability linear control system: Routh-Hurwitz
criterion. Frequency response method polar plots, Bodes plot, Magnitude versus phase shift plot frequency response of
feedback control system. Frequency domain specifications, MP and WP for a second order system; The Nyquist criterion
and stability ; ; Introduction, The Principle of argument the Nyquist path, Nyquist criterion and the GH Plot, The
application of the Nyquist criterion, The effects of additional poles and zeros of G(s) H(s) on the shape of the Nyquist
locus, Relative stability, gain margin, Phase margin, conditionally stable systems. The Root Locus Technique:
Introduction to Root Locus, construction of the root loci, some other properties of the root locus, root locus of
conditional stable systems; Compensator Design: Lag/Lead/Lag-Lead Compensator Design using Root Locus & Bode
Plot Methods ; State variable analysis: Introduction, Concept of state, state variable and state model, State equations of
continuous data control system, Derivation of state Model from transfer functions and Vice versa. Diagonalisation,
Solution of state equation.

6. **DIGITAL SIGNAL PROCESSING**
An introduction to signals and systems, and representation of signals in time domain, Linear, time-invariant systems,
impulse response and convolution sum, Fourier transform, Sampling and Reconstruction of continuous time signals,
Characterization and properties of discrete time signals and systems, Computation of the discrete time Fourier transform
and its properties, Computation of the discrete Fourier transform and its properties, Fast Fourier transform algorithms,
The Z-transform and its properties, The inverse z-transform, System function and system stability, Transform analysis of
linear time invariant systems, Implementation of structures for discrete time systems, Digital filter design techniques,
Design of FIR & IIR filters, Applications of DSP.

(Web)
http://nptel.ac.in/courses/108105055/

(Video)
http://nptel.ac.in/courses/117102060/
http://nptel.ac.in/courses/117101001/
http://nptel.ac.in/courses/117101123/
http://nptel.ac.in/courses/117104070/