



NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI - 620015

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING SYLLABUS FOR WRITTEN TEST

Engineering Mathematics

Linear Algebra, Calculus, Differential Equations, Analysis of Complex Variables, Probability and Statistics, Numerical Methods.

Electrical Circuits

Mesh and nodal analysis, Superposition, Thevenin, Norton and other basic theorems. Transient and steady state RLC circuitry analysis.

Signals and Systems

Periodic, aperiodic and impulse signals; Laplace, Fourier and z-transforms; transfer function, frequency response, impulse response of systems; convolution, correlation. Discrete time system.

Control Systems

Feedback principles, signal flow graphs, transient response, steady-state-errors, bode plot, phase and gain margins, Routh and Nyquist criteria, root loci, design of compensators, state-space representation of systems. On-off, P, PI, PID, cascade, feed forward, and ratio controllers, tuning of PID controllers and sizing of control valves.

Digital Electronics

Combinational logic circuits, minimization of Boolean functions. timers and counters; sample-and-hold circuit, multiplexer, analog-to-digital and digital-to-analog converters. Characteristics of ADC and DAC

Embedded Systems

Microprocessor and microcontroller applications, memory and input-output interfacing; basics of data acquisition systems, basics of distributed control systems (DCS) and programmable logic controllers (PLC).

Measurements

SI units, standards, systematic and random errors in measurement, expression of uncertainty - accuracy and precision, propagation of errors, linear and weighted regression. Bridges for measurement of R, L, C and frequency, Q-meter. timer/counter, time, phase and frequency measurements, digital voltmeter, digital multimeter; oscilloscope, shielding and grounding.

Sensors and Industrial Instrumentation

Resistive-, capacitive-, inductive-, piezoelectric, Hall effect sensors and associated signal conditioning circuits; transducers for industrial instrumentation: displacement , pressure (including low pressure), flow (variable head, variable area, electromagnetic, ultrasonic, turbine and open channel flow meters) temperature (thermocouple, bolometer, RTD (3/4 wire), thermistor, pyrometer and semiconductor); liquid level, 4-20 mA two-wire transmitter.