Syllabus for Ph-D Entrance Test 2019, for students registering under:

ELECTRONICS AND COMMUNICATION

ELECTRONICS AND INSTRUMENTATION

Circuits and Networks: KCL, KVL, Mesh analysis and Nodal analysis of DC/AC circuits, Start delta networks, Thevenin, Norton, Superposition, Maximum power transfer, Millman theorems, Resonance, Q-factor, bandwidth

Analog Electronics: BJT modeling, r_e model, hybrid model, hybrid π model, CE fixed bias, Voltage divider bias and emitter bias configurations, emitter follower, CB Configuration, cascaded systems Darlington connection, feedback pair, current mirror, current source. JFET Small Signal model, JFET Fixed bias, Self bias, Voltage divider bias configurations, source follower common gate configuration, design of FET amplifier, E-MOS and D-MOS amplifiers. General frequency considerations, low frequency response of BJT and FET amplifiers, Concept of feedback, feedback topologies, practical feedback circuits, basic principle of oscillators, RC, LC and crystal oscillators.

Linear Integrated Circuits: Op-amp characteristics, differential amplifier, adder, integrator, differentiator, monostable, bistable, astable multivibrators, voltage regulators, phase-locked loops

Instrumentation: Errors in measurement, Gross and systematic errors, Absolute and relative errors, static and dynamic characteristics, calibration
Transducers: Electrical transducer, Resistive, inductive, capacitive transducer, Differential output and LVDT, Piezoelectric, Photoelectric, Temperature, Pressure, Corrugated diaphragms
Sensors: Primary sensors, Smart sensors, Microsensors and MEMS, Actuators: Intelligent and self sensing, microactuators

Digital Electronics: Boolean algebra, logic gates, combinational circuits, flip flops, sequential circuits, registers and counters, comparators, encoders, multiplexer and de-multiplexers

Microprocessors and Microcontrollers: 8086 architecture, instruction set, hardware and software interrupts, DMA, MSP430 microcontroller architecture, instructions

Digital Signal Processing: Z-transforms, DTFT, DFT Properties, FFT algorithms (decimation in time and frequency), Design of FIR and IIR filters, Filter structures.

Control Systems: Transfer function modeling of electrical, mechanical and electromechanical systems, stability, time and frequency domain analysis, PID controller design, Root-locus techniques, bode plot, gain margin and phase-margin

Analog/Digital Communication: Basic communication principles, channel theory, Amplitude and frequency modulation/demodulation, basics of antennas and receivers, PSK, PAM, PWM, AM-SSB, AM-DSB