SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE 411 007.

Electronic-Science : Ph.D Entrance Syllabus

Unit—I

Electronic Transport in semiconductors, PN Junction, Diode equation and diode equivalent circuit,. Breakdown in diode. Zener diode, Tunnel diode, characteristics and equivalent circuits of BJT, JFET, MOSFET, Fabrication of Semiconductor devices and ICs.

Unit—II

SMPS, UPS, inverters, converters, Biasing of Bipolar junction transistors and JFET. Single stage amplifiers, Multistage amplifiers. Feedback in amplifiers, oscillators, function generators, multi vibrators, Operational Amplifiers (OPAMP)-characteristics and Applications, Computational Applications, Integrator, Differentiator, Wave-shaping circuits, F to V and V to F converters. Active filters, Schmitt trigger, Phase locked loop.

Unit—III

Logic families, flip-flops, Gates, Boolean algebra and minimization techniques, multiplexers and de multiplexers, Arithmetic circuits, Multivibrators and clock circuits, Counters-Ring, Ripple, Synchronous, Asynchronous, Up and down, shift registers, Memories, A/D and D/A converters.

Unit—IV

Architecture of microcontroller/microprocessor (Atmega, AVR, PIC, ARM), Embedded, Software development cycle, Memory and I/O interfacing, wired and wireless communication protocols, interrupts, embedded system design tools, Logic Analyzer, DAQ's, Operating system concepts and RTOS .

Unit—V

Maxwell's equations, Time varying fields, Wave equation and its solution, Rectangular waveguide, Poynting vector, Antenna parameters, Half-wave antenna, Transmission lines. Characteristic Impedance, Impedance matching, Smith chart

Unit—VI

Basic principles of amplitude, frequency and phase modulation, Demodulation, Intermediate frequency and principle of superheterodyne receiver, Spectral analysis and signal transmission through linear systems, Random signals and noise, Noise temperature and noise figure. Basic concepts of information theory, Digital modulation and Demodulation PM, PCM, ASK, FSK, PSK, Time-division Multiplexing, Frequency-Division Multiplexing, Data Communications-Circuits, line Codes, error detection and correction codes, GSM, GPRS and Modems.

Unit—VII

Optical sources-LED, Spontaneous emission, Stimulated emission, Semiconductor Diode LASER, Photodetectors-*p-n* photodiode, PIN photodiode, Phototransistors, Optocouplers, Solar cells, Display devices. Optical Fibres-Light propagation in fibre, Types of fibre, Characteristic parameters, Modes, Fibre splicing and connectors, Fibre optic communication system-coupling to and from the fibre, Modulation, Multiplexing and coding, Repeaters, Bandwidth and Rise time budgets.

Unit—VIII

Transduces-Resistance, Inductance Capacitance, Peizoelectric, Thermoelectric, Hall effect, Photoelectric, Techogenerators, Measurement of displacement, velocity, acceleration, force, torque, strain, speed and sound temperature, pressure, flow, humidity, thickness, pH, position.

UNIT-IX

Instruments – Digital Storage Oscilloscopes, signal generators, function generators, spectrum analyser, Power meters, dB meters, LUX meter, energy meters, GPS navigation system

Unit—X

Advanced Electronic Systems: DSP/Image Processing systems, Set top box, smart phone, digital camera, MP/MP4, SMART TV, CCTV, Solar PV system controllers, and converters