

ELECTRONIC SCIENCE

PAPER I

Fundamentals of semiconductors: electron transport, pn junction, diode equation, breakdown in diodes, photodiodes, tunnel diodes, BJT, JFET, MOSFET. IC fabrication-crystal growth, epitaxy, oxidation, lithography, doping, etching, isolation, metallization, bonding.

Network analysis : Superposition, Thevenin, Norton, maximum power transfer theorems, network elements, network graphs, node and mesh analysis, zeros and poles, Bode plots, Laplace transforms, time and frequency domain response , two port network parameters, transfer function, signal representation, state variable method of circuit analysis, ac circuit analysis, transient analysis.

Op –amp characteristics, feedback in amplifiers, Applications – amplifiers, computational, integrator, differentiator, wave shaping, F to V and V to F converters, active filters, Schmitt trigger. Timer 555 and PLL.

Number systems. Logic families, Boolean algebra, minimization techniques, flip flops (RS, JK D and T), Counters, Synchronous, asynchronous and up down, shift registers, multiplexers, de multiplexers. Arithmetic circuits, memories, A/D and D/A converters.

Programming in C : Introduction to data in C, operators and their precedence, data types, storage classes, branching and looping, arrays and strings, structure and union, user defined functions, pointers, file handling.

Analog communication systems, principles of amplitude, frequency and pulse modulation. Demodulation, super heterodyne receiver.

PAPER II

Max wells equations, time varying fields, wave equation and its solution, Poynting vector, transmission lines, smith chart, waveguides, microwave components – T, magic T, circulator, isolator, directional couple. Sources – reflex klystron, magnetron, Gunn diodes, crystal detector, PIN detector.

Architecture of 8085 and 8086 microprocessors, addressing modes, 8085 instruction set, interrupts, programming, memory and I/O interfacing, interface IC – 8255 (PPI), 8253 (PIT), 8251 (USART), DMA controller, 8051 microcontroller, architecture, instruction set, programming.

Basic concepts of measurement, static and dynamic characteristics of transducers, transducers for measurement of displacement, strain, temperature, flow, pressure. Data acquisition systems.

Open and closed loop control systems, signal flow graphs, Mason's gain formula, dynamic behavior of control systems – first and second order systems, transient response, stability, Routh – Hurwitz criterion, Bode plots , Nyquist criterion, on off control. Proportional (P), PI and PID control.

Basic components of a digital signal processing system, classification of signals and their characteristics, linearity, time

invariance, bounded, energy and power signals, sampling and quantization, discrete time systems and their properties, causality, stability. Time domain representation of LTI systems, impulse response, convolution, correlation, difference equation representation.

Frequency domain representation, z – transform and properties, zeros and poles, DFT, FFT algorithms, basic of FIR and IIR filters.

Digital modulation and demodulation, PM, PCM, ASK, FSK, PSK, TDM, FDM, Fibre optic communication system
– light propagation in fibre, characteristic parameters, losses in optical fibres, sources and detectors, Basics of satellite communication, power budget, Noise temperature and noise figure.

References :

1. Solid state Electronic Devices, Ben G Streetman, PHI.
2. Network Analysis, Van Valkenburg, PHI.
3. Programming with C.Schaum's Outline series, Byron S.Gottfried.
4. Digital logic and computer design, M Morris Mano, PHI.
5. Instrumentation Measurement and analysis, Nakra B and chaudry KK, TMH.
6. Microprocessors and Interfacing, Douglas V Hall, TMH.
7. Intel Microprocessors, Architecture, programming and Interfacing, Barry B, Brey, PHI.
8. Microwave Devices and Circuits, Liao Samuel Y, PHI.
9. The 8051 Microcontroller, Kenneth J Ayala, Panram International.
10. Digital Signal Processing, Oppenheim and Schaffer, PHI.
11. Electronic Communication systems, George Kennedy and Bernard Davis TMH.
12. Control Systems Engineering, Nagath A J and Gopal M, New Age International.
13. OP Amps and Linear Integrated Circuits. Ramakanth A. Gayakwad. PHI India Ltd.
14. Networks, Lines and Fields, J.D.Ryder PHI.