

## EC 601-Communication Network and Transmission Lines

**Unit – I Introduction:** Characteristic parameters of symmetrical and asymmetrical two port networks and their design: image impedance, iterative impedance, characteristic impedance, propagation coefficient, image transfer coefficient, iterative transfer coefficient, Lattice and Bridged-T networks, reactive matching networks, matching techniques, insertion loss.

**Unit – II Passive LC Filters:** Analysis and design of low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, filter specifications, butterworth approximation, chebyshev approximation, frequency transformation.

**Unit – III Network Synthesis:** Positive real function, LC, RL, RC, and RLC network synthesis, Foster and Cauer network, minimum positive real function, Brune's method, Bott-Duffin method, synthesis-coefficient.

**Unit – IV Transmission line fundamentals:** Lumped parameter equivalent, voltage and current on a transmission line, infinite line, characteristic impedance and propagation constant, waveform distortion, attenuation and phase equalizers, distortion-less line, loading, liner reflection on a line, reflection coefficient, input and transfer impedances, open circuit and short circuit line, reflection factors, reflection loss, insertion loss, T and equivalents of a line, location of line fault.

**Unit – V Line at radio frequencies:** Parameters of line and coaxial cable at radio frequencies, dissipation-less line, voltage and current on a dissipation-less line, standing waves, standing wave ratio, input impedance of open circuit and short circuit, power and impedance measurement on lines, eighth-wave, quarter-wave and half wave line.

**Impedance matching:** Quarter wave transformer, impedance matching by stubs, single stub and double stub matching, smith chart, solutions of problems using smith chart, single and double stub matching using smith chart.

### References:

1. J.D. Ryder: Networks and Transmission Lines, 2nd edition, PHI
2. M.E. Valkenberg: Introduction to Modern Network synthesis, Wiley Eastern Ltd.
3. G.K. Mithal: Network Analysis, Khanna Publishers.
4. Umesh Sinha: Networks and Transmission Lines, Satya Prakashan.

### List of Experiments:

1. To set up Transmission Line Analyzer for measurements.
2. To set up the standing waves formation on a transmission line and observe their maxima and minima using frequency domain method.
3. To measure the characteristic impedance of transmission lines using frequency domain method and to differentiate between the matched and unmatched lines.
4. To measure the VSWR, reflection coefficient and return loss in a transmission line.
5. To measure the dielectric constant of insulator in the transmission line.
6. To measure the velocity of propagation and wavelength in the given transmission line.
7. To study the effect of reactive loads on transmission lines.
8. To study the difference between lossy and loss less line.

## EC 602- VLSI Circuits

**Unit I Introduction:** Concept of CMOS VLSI circuit, VLSI design flow, MOS transistor as a switch, CMOS Logic, NMOS and CMOS fabrication, combinational circuits latches, register, threshold voltage with body effect, model parameter & its variation with scaling and biasing.

**Unit II Dynamic CMOS Circuits:** Clocked CMOS (C2MOS) logic, DOMINO logic, NORA logic, NP (ZIPPER) logic, PE (pre-charge and Evaluation) Logic, basic memory circuits, SRAM and DRAM.

**Unit III Synchronous Sequential Machine:** Introduction and characterizing equation of synchronous sequential machines, realization of state diagram and state table from verbal description, Mealy and Moore model machines state table and transition diagram, minimization of the state table of completely and incompletely specified sequential machines.

**Asynchronous Sequential Machine:** Introduction to asynchronous sequential machine, fundamental mode & pulse mode asynchronous sequential machine, secondary state assignments.

**Unit IV Fault Detection in Combinational Circuit:** Types of faults, fault detection using boolean difference and path sensitization method, PROM, PLA, PAL, CPLD and FPGA, PALASM software applications.

**State Machine:** Algorithmic state machine, fundamental concept of hardware/ firmware algorithms, Controllers and data system designing.

**Unit V Layout for Gates:** Basic physical design of simple gates and layout issues, layout issues for CMOS inverter, layout for NAND, NOR and complex logic gates, layout optimization using Euler path, DRC rules for layout and issues of interconnects, latch up, VHDL code for simple logic gates, flip-flops, shift registers.

### References:

1. Geiger, Allen and Strader: VLSI Design Techniques for Analog and Digital Circuits, TMH.
2. Sorab Gandhi: VLSI Fabrication Principles, Wiley India.
3. Weste and Eshraghian: Principles of CMOS VLSI design, Addison-Wesley
4. Weste, Harris and Banerjee: CMOS VLSI Design, Pearson-Education.
5. Pucknell and Eshraghian: Basic VLSI Design, PHI Learning.

### List of Experiments:

1. Design Universal gates and all other gates using S-edit and getting its transient response
2. Obtain the DC- characteristics of CMOS Inverter using DC-analysis.
3. Design Symbol of CMOS Inverter and using instances of its getting transient response.
4. Design Symbol of Universal gates and using instances of them getting transient response.
5. Design a Transmission gate using PMOS & NMOS by instance calling.
6. Design the Layout of NMOS and PMOS transistor.
7. Design the Layout of CMOS Inverter.

8. Design the Layout of Universal gates.
9. Design all universal gates and flip-flops using different coding styles of VHDL.
10. Design a serial to parallel shift register using VHDL and download on FPGA kit

### EC603- Data Communication & Computer Networks

**Unit – I Introduction :** Data communications, networks, the internet, protocols and standards, network models, layered tasks, OSI model, layers in the OSI model, TCP/IP protocols suite, addressing, physical layer and media, data and signals, analog and digital, periodic analog signals, digital signals, transmission impairment, data rate limits, performance, digital transmission, digital-to-digital conversion, analog-to-digital conversion, analog transmission, digital-to-analog conversion, analog-to-analog conversion.

**Unit – II Bandwidth utilization :** Multiplexing and spreading, multiplexing, spread spectrum, transmission media, guided media, unguided media; wireless, switching, circuit-switched networks, datagram networks, virtual-circuit networks, structure of a switch, using telephone and cable networks for data transmission, telephone networks, dial-up- modems, digital subscriber line, cable TV networks, cable TV for data transfer.

**Unit – III Error Detection and Correction:** Introduction, block coding, liner block codes, cyclic codes, checksum, data link control, framing, flow and error control, protocols, noiseless channels, HDLC, point-to-point protocol, multiple access, random access, aloha, controlled access, channelization, IEEE standards, standard ethernet, changes in the standard, fast ethernet, gigabit ethernet, IEEE 802.11, bluetooth.

**Unit – IV Data Communication and Networks:** Data Communication, networks physical structures; different topologies, categories of networks: LAN, MAN, WAN, interconnection of networks, the internet, protocols and standards, standards organizations. network models, layered tasks, digital signals- Bit Length, Digital Signal as a Composite Analog Signal, Transmission of Digital Signals, Data Rate Limits-Noiseless Channel, Noisy Channel.

**Unit – V LAN:** Connecting LANs, backbone networks, and virtual LANs, connecting devices, backbone networks, cellular telephony, satellite networks, Sonet/SDH, architecture, sonet layers, sonet frames, STS multiplexing, sonet networks, virtual tributaries, virtual-circuit networks.

#### References:

1. Introduction to Data Communications and Networking, W. Tomasi, Pearson education.
2. Data and Computer Communications, G.S. Hura and M.Singhal, CRC.
3. Computer Networks, A.S. Tanenbaum, 4<sup>th</sup> edition, Pearson education.
4. Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan, TMH.

## EC604-Digital Signal Processing

**Unit – I Discrete-Time Signals and Systems :** Review of discrete-time sequences and systems, linear constant coefficient difference equations, derivation of transfer function of LTI systems, frequency domain representation of discrete time signals & systems, signal flow graph representation of digital network, matrix representation , introduction to two dimensional sequences and systems.

**Unit – II The z-Transform Applications :** The review of direct Z-transform and inverse- Z transform, mapping of S-domain to Z-domain, system stability in Z-domain, rational Z-transforms, chirp – Z transform, two dimensional Z-transform, design of LTI systems using Z-transform.

**Unit – III Frequency Analysis of Discrete Time Signals :** discrete fourier series (DFS), comparison of the DFS and discrete fourier transform (DFT), properties of DFT, circular convolution, two dimensional DFT, FFT algorithms, Radix-2 FFT Algorithm, Goertzel's Algorithm, decimation in time, decimation in frequency algorithm, decomposition for 'N' composite number.

**Unit – IV Basic filter structures :** Recursive and non – recursive networks, system connectivity, basic structures of IIR and FIR filters, determining of system response, impulse response and transfer function of filters, determining impulse response using recursion formula, finite word-length effects in digital filters.

**Unit – V Digital filters Design Techniques :** Design of IIR and FIR digital filters, impulse invariant and bilinear transformation, windowing techniques – rectangular and other windows, application of MATLAB for design of digital filters, concept of adaptive filtering and applications.

### References:

1. A.V. Oppenheim and R.W. Schaffer: Digital Signal Processing, Prentice Hall.
2. L.R. Rabiner and B. Gold: Theory and Application of Digital Signal Processing, Prentice Hall.
3. John. G. Proakis and Monolakis: Digital Signal Processing, Pearson Education.
4. Salivahanan and Vallavraj: Digital Signal Processing, Mc Graw Hill.
5. S.K. Mitra: Digital Signal Processing – A Computer based Approach, Mc Graw Hill.
6. Schilling and Harris: Fundamentals of DSP using MATLAB, Cengage Learning.

### List of Experiments (Extendable)

1. Generation, analysis and plots of discrete-time signals.
2. Implementation of operations on sequences (addition, multiplication, scaling, shifting, folding etc).
3. Implementation of Linear time-invariant (LTI) systems and testing them for stability and causality.
4. Computation and plots of z-transforms, verification of properties of z-transforms.
5. Computation and plot of DFT of sequences, verification of properties of DFT.
6. Implementation of various window design techniques (Rectangular, Bartlett, Hann, Hamming etc).

## **EC-605 Principles of Management & Managerial Economics**

**Unit I - Management:** Scientific Management, Principles of Management, Administration and Organization, Difference and Relationship between Organization Management and Administration. Importance of Management, Characteristics of Management.

**Unit II – Management Planning:** Management Functions: Meaning of Planning, Advantages of Planning, Organizing: Organizing defined, process of Organizing, Principles of organizing, Organizational structure, staffing Process of Management, Levels of Management, Project Management.

**Unit III - Decision Making:** Introduction and Definition, Types of Decisions, Techniques of Decision Making, Decision Making under risk.

**Unit IV - Managerial Economics:** Introduction, Nature & Scope of Managerial economics Application of Economics in Managerial Decision Making, Micro and Macro-economics, Theory of the Firm, Theory of Production Function.

**Unit V - Productivity:** Input-Output Analysis, Micro-economics Applied to Plants and Industrial Undertakings, Production and Production system, Productivity, Factors affecting Productivity, Increasing Productivity of Resources.

### **References:**

1. Peter Dracker, Harper and Row: The Practice of Management.
2. Koontz: Essentials of Management, PHI Learning.
3. Staner: Management, PHI Learning.
4. Daft: Principles of Management, Cengage Learning.
5. T. N. Chhabra: Principle and Practice of Management, Dhanpat Rai, New Delhi.
6. Hirschey: Managerial Economics, Cengage Learning.
7. T. R. Banga and S.C. Sharma: Industrial Organisation and Engineering Economics, Khanna Publishers
8. O.P. Khanna: Industrial Engineering and Management, Dhanpat Rai.
9. Joel Dean: Managerial Economics, PHI learning.
10. V. L. Mote, Samuel Paul and G.S. Gupta: Managerial Economics Concepts & Cases, TMH, New Delhi.
11. V. L. Mote: Managerial Economics, TMH, New Delhi

### **EC 606 - Minor Project**

The selection of topic should be from the subjects the student has studied so far or any topic related to real life problem. He should do the literature survey, analyze the problem and propose some solution for the same. The analysis of the problem may be done with the help of some software or any hardware (which may be made by the student). Following points are important:

1. Presentation of project with the help of power point presentation at the end of the semester is compulsory.
2. A detailed report regarding the topic should be submitted before the internal examination