MA206

Course Objective

To expose the students to the basics of probability theory and random processes essential for their subsequent study of analog and digital communication.

Probability theory and Random Processes (3 -0- 0) 3

Axioms of probability theory. Probability spaces. Joint and conditional probabilities- Bayes' Theorem- Independent events.

Random variables and random vectors. Distributions and densities. Independent random variables – Functions of one and two random variables.

Moments and characteristic functions. Inequalities of Chebyshev and Schwartz. Convergence concepts.

Random processes. Stationarity and ergodicity. Strict sense and wide sense stationary processes - Covariance functions and their properties. Spectral representation. Wiener-Khinchine theorem.

Gaussian processes. Processes with independent increments. Poisson processes. Lowpass and Bandpass noise representations.

Course Outcome

To understand the basics of probability theory and random processes.

To understand and apply the knowledge in analog and digital communication problems.

References:

Davenport, Probability and Random Processes for Scientist and Engineers, McGraw-Hill

Papoulis,A.,Probability, Random variables and Stochastic Processes, McGraw Hill.

EC202

Course Objective

The subject aims to introduce the mathematical approach to manipulate discrete time signals, which are useful to learn digital telecommunication.

Digital Signal Processing (3 – 0 - 0) 3

Review of LSI system theory. DTFT. Frequency response of discrete time systems. All pass, inverse and minimum phase systems.

DFT. Relationship of DFT to other transforms. FFT. DIT and DIF FFT algorithm. Linear filtering using DFT and FFT.

Frequency response of FIR filter types. Design of FIR filters. IIR filter design. Mapping formulas. Frequency transformations.

Direct form realization of FIR and IIR systems. Lattice structure for FIR and IIR systems. Finite-word length effects. Limit cycle oscillations.

Sampling rate conversion by an integer and rational factor. Polyphase FIR structures for r sampling rate conversion.

Course Outcome

Ability to design and realize the digital filters.

Ability to manipulate the discrete time signals in both time and frequency domain.

References

J.G.Proakis etal, Digital Signal Processing, (3/e) Pearson, 2003

S.K.Mitra, Digital Signal Processing (2/e), TMH, 2001

J.R.Jhonson, Introduction to Digital Signal Processing, Prentice-Hall, 1989.

A.V.Oppenheim & R.W.Schafer, Discrete Time Signal Processing(2/e), Pearson Education, 2003.

IC218

Course Objective

To familiarize the students with the need for modeling of systems and to represent the system in various ways mathematically.

To teach them the various well established techniques to analyze the stability of systems and related issues.

Control Systems (3 – 0 - 0) 3

Block-diagram algebra. Time response of poles. Ruth – Hurwitz criterion. Basic feedback loop. Asymptotic tracking and performance.

Root loci. Properties. Stability range from the loci. Design using root loci, proportional controller, phase lead controller and PD controller.

Frequency domain techniques. Bode and Nyquist plots. Phase and gain margins. Frequency domain specifications. Controller design.

State - space techniques. Canonical form for SISO continuous-time and discrete-time systems. Solution of state equations. State models of MIMO systems. Stability analyses. Lyapunov criterion for stability.

Controllability and observability. Design of state feedback controllers. Full order and reduced order observers. Design of observers for continuous-time and discrete-time systems.

Course Objective

Ability to understand the basic concepts of control systems .

Ability to identify and apply their knowledge in designing a stable system

References:

A.Ramakalyan, Control Engineering, Vikas, 2003

R.C.Dorf & R.H.Bishop, Modern Control Systems (8/e), Pearson, 1999

EC204

Course Objective

To expose students to the complete fundamentals and essential feature of waveguides, resonators and microwave components and also able to give an introduction to microwave integrated circuit design.

Transmission Lines and Wave guides (3 – 0 - 0) 3

Classification of guided wave solutions-TE, TM and TEM waves. Field analysis transmission lines.

Rectangular and circular waveguides. Excitation of waveguides. Rectangular and circular cylindrical cavity resonators.

Transmission line equations. Voltage and current waves. Solutions for different terminations. Transmission-line loading.

Impedance transformation and matching. Quarter-wave and half-wave transformers. Binomial and Tchebeyshev transformers. Single, double and triple stub matching .

Microstriplines, stripline, slot lilne, coplanar waveguide and fin line. Microstrip MIC design aspects. Computer-aided analysis and synthesis.

Course Outcome

To understand the fundamentals of Transmission lines and waveguides.

To apply the knowledge to understand various Microwave components

References:

R.E.Colllin, Foundations for Microwave Engineering (2/e), McGraw-Hill,2002.

D.M.Pozar, Microwave Engineering (2/e) Wiley,1999.

EC206

Electronic Circuits (3 – 0 - 0) 3

Rectifier circuits and filters. MOSFET and BJT amplifiers. Biasing. Low and high frequency models for MOSFET and BJT. Analysis of various amplifier circuits-comparison.

MOSFET, BJT and BiCMOS circuits. Frequency response of CS and CE amplifiers with active load. Cascode amplifiers. Source and emitter follower.

MOS and BJT differential amplifiers. Differential amplifiers with active load. Two stage amplifiers.

Feedback concept. Properties. Feedback amplifiers. Stability analysis. Sinusoidal oscillators. Condition for oscillation.

Output stages, class A, class B, class AB, Biasing circuits. Power amplifiers. IC power amplifiers.

References:

A.S.Sedra & K.C.Smith, Microelectronic Circuits (5/e), Oxford, 2004.

EC208

Course Objective

This subject deals about the basic 16-bit (8086) processor and an 8-bit (8051) controllers, their architecture ,internal organization and their functions, interfacing an external device with the processors/ controllers.

Microprocessors and Microcontrollers (3 – 0 - 0) 3

Microprocessor based personal computer system. Programming model and instruction sets for 8086 microprocessor. Parallel and serial data communications.

Assembly level programming and programming with DOS and BIOS function calls using disks and files. Interrupt hook.

Hardware details of 8086. Memory interface. Parallel and serial data transfer. Data converter interfacing. Interrupt controller and timer chips.

8051 microcontroller , programming model, instruction set. Assembly level programming. Introduction to PIC microcontroller.

Interrupts. Parallel and serial port interfacing. Interfacing of DAC, ADC, Key board and displays to microcontroller.

Course Outcome

Through this course the students developed their own applications using sensors, ADC's, LCD displays.

Implementing their code using software and realization through hardware helped them in understanding things better including the practical difficulties in interfacing, data transfer,ADC conversions.

Refereces:

B.B.Brey, The Intel Microprocessors, Pearson.

I.L.Antonakos, An Introduction to the Intel Family of Microprocessors, Pearson, 1999

Muhammad Ali Mazidi, The 8051 Microcontroller and Embedded Systems (2/e), Pearson.

John Morton, The PIC Microcontroller - Your Personal Introductory Course (3/e), Elsevier.

EC210

Electronic Circuits Laboratory 0 - 0 - 3 – 2

EC212

Microprocessor and Microcontroller Laboratory 0 - 0 - 3 – 2