

## **MTEI - 201 ELECTRONIC SYSTEM DESIGN**

### **UNIT -I DESIGN CONCEPTS & LOGIC CIRCUITS**

Digital Hardware, Design Process, Design of Digital Hardware Variables & Functions Logic gates & Networks synthesis, SOP, POS forms, Introduction to VHDL.

### **UNIT- II OPTIMIZED IMPLEMENTATION OF LOGIC FUNCTIONS:**

Strategy for minimization, Incompletely specified functions, Multiple output circuits, Multilevel synthesis & Analysis Building Block of combinational circuits, Multiplexers Decoders, Encoders Code Converters.

### **UNIT- III SYNCHRONOUS SEQUENTIAL CIRCUITS**

Basic Design Steps, Mealy state Model, Design of FSM,

### **UNIT – IV ASYNCHRONOUS SEQUENTIAL CIRCUITS**

Analysis, Synthesis, State Reduction, State Assignment, Hazards.

### **UNIT V TESTING OF LOGIC CIRCUITS**

Fault Model, Path sensitizing, Random testing, Circuits with Tree Structure.

### **BOOK:**

1. Introduction to Logic Design – MARCOVITZ – (Text )

### **REFERENCES:**

1. Engineering Digital Design – TINDER
2. An Engineering Approach to Digital Design – FLETCHER
3. Logic and Computer Design Fundamentals – MANO

## **MTEI – 202 ADVANCE DIGITAL SIGNAL PROCESSING**

### **UNIT -I**

Review of Digital Signal Processing: Review of discrete-time sequences and systems, Linear Shift Invariant (LSI) systems. Causality and Stability Criterion, FIR & IIR representations, Z-Transform, Digital structures, Fast Fourier Transform, Discrete Fourier Transform (DFT), Fast Fourier Transform (FFT) algorithms using decimation in time and decimation in frequency techniques, Chirp Z- Transform, Hilbert Transform and applications.

### **UNIT -II**

Digital Filter design: FIR filter design, IIR filter design from analog filters, digital filter design based on least square method.

### **UNIT -III**

Multirate Digital Signal Processing: Decimation & Interpolation, Sampling rate conversion, Filter design and implementation for sampling rate conversion, applications of multirate signal processing

### **UNIT -IV**

Filter Banks: QMF, M-Channel uniform and non-uniform filter banks, transmultiplexers.

### **UNIT -V**

Wavelets: Introduction, the short-time Fourier transform, the wavelet transform, discrete-time orthonormal wavelets, continuous-time orthonormal wavelets.

### **References**

1. J.G.Proakis & D.G.Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", PHI
2. P.P.Vaidyanathan, "Multirate Systems and Filter Banks", Pearson
3. S.K. Mitra, "Digital Signal Processing", TMH

## **MTEI – 203 ANALOG INTEGRATED CIRCUITS**

### **UNIT-I**

Introduction to Analog Design, Basic MOS device physics and Models. Single stage Amplifiers: Common-Source, Common-Drain, Common-Gate, Cascode stage, Folded Cascode.

### **UNIT-II**

Differential Amplifiers: Single-ended and Differential operation, common-mode response, differential pair with MOS loads, Gilbert cell, Passive and Active current mirrors, cascade current mirrors.

### **UNIT-III**

Frequency response of Amplifiers, Miller effect, Poles and Zeros. Noise: Types of noise, Noise Figure, Representation of Noise in circuits, Noise bandwidth, Noise in single stage amplifiers.

### **UNIT-IV**

Feed Back: Properties of feedback circuits, Feedback topologies: Voltage-Voltage, voltage-current, current-voltage, current-current feedback. Effect of loading.

### **UNIT-V**

Operational Amplifiers: Performance parameters, One-stage Op-Amps., Two-Stage Op-Amps, Gain Boosting, Noise in Op-Amps, Stability and Frequency Compensation, band gap references. Introduction to switched capacitor circuits: MOS as switch, Switched-capacitor Amplifiers, Switched-Capacitor Integrator.

### **References:**

1. Design of Analog CMOS Integrated Circuits - Behzad Razavi, McGraw-hill, 2001.
2. Analog Integrated Circuit Design – David Johns, Ken Martin, John Willy and Sons, 1996.
3. Analysis and design of Analog Integrated Circuits – Gray, Hurst, Lewis and Mayer, 4<sup>th</sup> edition, John Willy and Sons.
4. Microelectronics Circuits – Sedra and Smith, Oxford University Press, 2005.

## **MTEI – 204 EMBEDDED SYSTEM**

### **UNIT -I**

**8 Bit Micro controllers:** Introduction to MCS-51 family, Peripheral of MCS-51 family, PIC Micro Controller –CPU architecture, registers, instruction sets addressing modes, loop timing, On chip Peripherals of PIC, Motorola MC68H11 Family Architecture Registers, Addressing modes, Interrupts- features of interrupts- Interrupt vector and Priority, timing generation and measurements, Input capture, Out capture.

### **UNIT -II**

**16 Bit Micro controller:** Introduction to MCS-96 family, Peripherals of MCS-96 family, 80196-architecture, CPU operation, memory organization, I/O port, Operand addressing, instruction set, Interrupts, On chip Peripherals-PWM, Timers, HIS/HSO, Serial Port, External memory interfacing.

### **UNIT -III**

**32 bit Micro controller:** Intel 80960-architecture, memory address space, Salient features of ARM processor family-ARM7 /ARM9/ ARM9E/ ARM10/ ARM11/ SecureCore /Strong ARM, XScale technology, ARM9200 Architecture, Pinouts, Peripheral Identifier, System Interrupts, External Interrupts, Product memory mapping, External memory mapping, Internal memory mapping, On chip Peripherals-Memory controllers, external Bus Interface(EBI), Advanced interrupt controller(AIC), USART, Timer counter.

### **UNIT -IV**

**Software development and tools:** Embedded system evolution trends. Round- Robin, Round-robin with Interrupts, function- One- Scheduling Architecture, Algorithms. Introduction to- assembler- compiler- cross compilers and Integrated Development Environment (IDE) Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

### **UNIT -V**

**Real Time Operating Systems:** Task and Task States, tasks and data, semaphores and shared Data Operating system Services- Message queues- Timer Function- Events- Memory Management, Interrupt Routines in an RTOS environment, basic design Using RTOS.

### **References:**

- David E Simon, “ An embedded software Primer” Pearson education Asia.
- John B Peat man “ Design with Micro controller” Pearson education Asia.
- Jonarthan W. Valvano Brooks/cole “ Embedded Micro Computer Systems. Real time Interfacing”, Thomson learning

## **MTEI – 205 INSTRUMENTATION SYSTEM DESIGN**

### **UNIT -I**

Introduction to Chemical instrumental analysis, advantages over classical methods, Classification: Spectral, electro analytical and separative methods, Laws of photometry (Beer and Lambert's law), Basic Components of analytical instruments.

Chromatography: Classification, Gas chromatography: principle, constructional details, GC detectors, Estimation of oxygen, hydrogen, methane, carbon dioxide, CO, etc. in binary or complex gas mixtures. Zirconia-probe oxygen analyser. Paramagnetic oxygen meters.

### **UNIT -II**

Colorimeters, spectrophotometers (UV-Visible), monochromators, filters, grating, prism, dual wavelength and double monochromator systems, rapid scanning spectrophotometers, IR spectrophotometers.

### **UNIT -III**

Flame Photometry: Principle, constructional details, flue gases, atomizer, burner, optical system, recording system. Atomic absorption spectrophotometers: Theoretical concepts, instrumentation: hollow cathode lamps, burners and flames, plasma excitation sources, optical and electronic system

### **UNIT -IV**

Measurement of pH, Conductivity, particle counting, detection on the basis of scattering- Nephelometer, Laboratory Instruments: Centrifuge, oven, waterbath, Incubators, stirrers, Densitometer,

### **UNIT -V**

Mass Spectrometer (MS): Principle, ionization methods, mass analyzer types - magnetic deflection type, time of flight, quadrupole, double focusing, detectors for MS, applications X-ray spectrometry: Instrumentation for X-ray spectrometry, X-ray diffractometer.

### **Textbooks/ Reference books:**

1. Instrumental Methods of Analysis, Willard, Merritt, Dean, Settle, CBS Publishers & Distributors, New Delhi, Seventh edition.
2. Handbook of Analytical Instruments, R. S. Khandpur, Tata McGraw-Hill Publications, 3rd edition
3. Instrumental Methods of Chemical Analysis, Galen W. Ewing, McGraw-Hill Book Company, Fifth edition.
4. Introduction to Instrumental Analysis, Robert D. Braun, McGraw-Hill Book Company