MEDI - 201 ELECTRONIC SYSTEM DESIGN

UNIT -I DESIGN CONCEPTS & LOGIC CIRCUITS

Digital Hardware, Design Process, Design of Digital HardwareVariables & 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

MEDI – 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

MEDI – 203 INTELLIGENT INSTRUMENTATION SYSTEM

UNIT-I

Intelligent versus Dumb instruments, A historical perspective of instrumentation systems. Review of digital transducers. Interfacing micro computers. Computer ports to high power devices. Optical shaft encoder communication standards. Concepts of Real Time system and its application.

UNIT -II

Details of Data Acquisition systems (DAS) Logic control systems, Continuous & Batch modes, Single and multi loop controller. Details of Data logger and its application.

UNIT -III

Architecture of Virtual instrument and its relation to operating system. Software overview: LABVIEW, Graphical User Interface (GUI), Control and indicators: G programming- Data type, Data flow programming editing and running a virtual instrument.

UNIT-IV

G Programming details in LABVIEW, G Programming tools and libraries. Programming structure: For loop, While loop. CASE structure, Sequence Structure arrays and clusters. Array operations- Bundle/Unbundled String and file I/O. High level and low level I/Os. Attribute nodes, Local and global variables.

UNIT -V

Software development for Temperature (Low and High), Level, Speed, pressure etc.

References:

- Barney G C, Intelligent Instrumentation : Micro processor application in measurement and control, Prentice Hall, Engle Wood Cliff NJ.
- H S Store, Micro Computer Interfacing, Addison Wesley, Reading, MA
- Rathore T S, Digital Instrumentation, TMH
- Interfacing sensors to the IBM PC, Prentice Hall, Engle Wood Cliff NJ.
- Garry M. Johnson " LAB view Graphical Programming", TMH.
- Lisa K. Wells "Labview for Every one, PHI.
- Barry Paton, "Sensor, Transducers and Labview", Prentice Hall.

MEDI – 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.
- Jonartthan W. Valvano Brooks/cole " Embedded Micro Computer Systems. Real time Interfacing", Thomson learning

MEDI – 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-Nephalometer, 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, quadruple, 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