ENGINEERING MATHEMATICS – III

CODE: 10 MAT 31 **IA Marks: 25**
Hrs/Week: 04 **Exam Hrs: 03**
Total Hrs: 52 **Exam Marks:100**

PART-A

Unit-I: FOURIER SERIES

Convergence and divergence of infinite series of positive terms, definition and illustrative examples* Periodic functions, Dirichlet's conditions, Fourier series of periodic functions of period 2π and arbitrary period, half range Fourier series. Complex form of Fourier Series. Practical harmonic analysis.

[7 hours]

Unit-II: FOURIER TRANSFORMS

Infinite Fourier transform, Fourier Sine and Cosine transforms, properties, Inverse transforms

[6 hours]

Unit-III: APPLICATIONS OF PDE

Various possible solutions of one dimensional wave and heat equations, two dimensional Laplace's equation by the method of separation of variables, Solution of all these equations with specified boundary conditions. D'Alembert's solution of one dimensional wave equation.

[6 hours]

Unit-IV: CURVE FITTING AND OPTIMIZATION

Curve fitting by the method of least squares- Fitting of curves of the form $y = ax+b,\ \ y=a\,x^2 + b\,x+c,\ y = a\,e^{bx},\ \ y = ax^b$

Optimization: Linear programming, mathematical formulation of linear programming problem (LPP), Graphical method and simplex method. **[7 hours]**

PART-B

Unit-V: NUMERICAL METHODS - 1

Numerical Solution of algebraic and transcendental equations: Regula-falsi method, Newton - Raphson method. Iterative methods of solution of a system of equations: Gauss-seidel and Relaxation methods. Largest eigen value and the corresponding eigen vector by Rayleigh's power method.

[6 hours]

Unit-VI: NUMERICAL METHODS – 2

Finite differences: Forward and backward differences, Newton's forward and backward interpolation formulae. Divided differences - Newton's divided difference formula, Lagrange's interpolation formula and inverse interpolation formula.

Numerical integration: Simpson's one-third, three-eighth and Weddle's rules (All formulae/rules without proof)

[7 hours]

Unit-VII: NUMERICAL METHODS – 3

Numerical solutions of PDE – finite difference approximation to derivatives, Numerical solution of two dimensional Laplace's equation, one dimensional heat and wave equations

[7 hours]

Unit-VIII: DIFFERENCE EQUATIONS AND Z-TRANSFORMS

Difference equations: Basic definition; Z-transforms – definition, standard Z-transforms, damping rule, shifting rule, initial value and final value theorems. Inverse Z-transform. Application of Z-transforms to solve difference equations.

[6 hours]

Note: * In the case of illustrative examples, questions are not to be set.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers
2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

Reference Book:

1. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
2. Peter V. O'Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd.Publishers

ANALOG ELECTRONIC CIRCUITS
(Common to EC/TC/EE/IT/BM/ML)

Sub Code	**:**	**10ES32**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT 1:
Diode Circuits: Diode Resistance, Diode equivalent circuits, Transition and diffusion capacitance, Reverse recovery time, Load line analysis, Rectifiers, Clippers and clampers.

UNIT 2:
Transistor Biasing: Operating point, Fixed bias circuits, Emitter stabilized biased circuits, Voltage divider biased, DC bias with voltage feedback, Miscellaneous bias configurations, Design operations, Transistor switching networks, PNP transistors, Bias stabilization.

UNIT 3:
Transistor at Low Frequencies: BJT transistor modeling, Hybrid equivalent model, CE Fixed bias configuration, Voltage divider bias, Emitter follower, CB configuration, Collector feedback configuration, Hybrid equivalent model.

UNIT 4:
Transistor Frequency Response: General frequency considerations, low frequency response, Miller effect capacitance, High frequency response, multistage frequency effects.

PART – B

UNIT 5:
(a) General Amplifiers: Cascade connections, Cascode connections, Darlington connections.
(b) Feedback Amplifier: Feedback concept, Feedback connections type, Practical feedback circuits.

UNIT 6:
Power Amplifiers: Definitions and amplifier types, series fed class A amplifier, Transformer coupled Class A amplifiers, Class B amplifier operations, Class B amplifier circuits, Amplifier distortions.

UNIT 7:
Oscillators: Oscillator operation, Phase shift Oscillator, Wienbridge Oscillator, Tuned Oscillator circuits, Crystal Oscillator. (BJT Version Only)

UNIT 8:
FET Amplifiers: FET small signal model, Biasing of FET, Common drain common gate configurations, MOSFETs, FET amplifier networks.

TEXT BOOK:
1. **"Electronic Devices and Circuit Theory",** Robert L. Boylestad and Louis Nashelsky, PHI/Pearson Eduication. 9TH Edition.

REFERENCE BOOKS:
1. **'Integrated Electronics',** Jacob Millman & Christos C. Halkias, Tata - McGraw Hill, 1991 Edition
2. **"Electronic Devices and Circuits",** David A. Bell, PHI, 4th Edition, 2004
3. "**Analog Circuits: A Fundamental Approach**", U B Mahadevaswamy, Pearson/Saguine, 2007

LOGIC DESIGN
(Common to EC/TC/EE/IT/BM/ML)

Sub Code	**:**	**10ES33**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT 1:
Principles of combinational logic-1: Definition of combinational logic, Canonical forms, Generation of switching equations from truth tables, Karnaugh maps-3, 4 and 5 variables, Incompletely specified functions (Don't Care terms), Simplifying Max term equations.

UNIT 2:
Principles of combinational Logic-2: Quine-McCluskey minimization technique- Quine-McCluskey using don't care terms, Reduced Prime Implicant Tables, Map entered variables.

UNIT 3:

Analysis and design of combinational logic - I: General approach, Decoders-BCD decoders, Encoders.

UNIT 4:

Analysis and design of combinational logic - II: Digital multiplexers- Using multiplexers as Boolean function generators. Adders and subtractors-Cascading full adders, Look ahead carry, Binary comparators.

PART – B

UNIT 5:

Sequential Circuits – 1: Basic Bistable Element, Latches, SR Latch, Application of SR Latch, A Switch Debouncer, The $\overline{S}\,\overline{R}$ Latch, The gated SR Latch, The gated D Latch, The Master-Slave Flip-Flops (Pulse-Triggered Flip-Flops): The Master-Slave SR Flip-Flops, The Master-Slave JK Flip-Flop, Edge Triggered Flip-Flop: The Positive Edge-Triggered D Flip-Flop, Negative-Edge Triggered D Flip-Flop.

UNIT 6:

Sequential Circuits – 2: Characteristic Equations, Registers, Counters - Binary Ripple Counters, Synchronous Binary counters, Counters based on Shift Registers, Design of a Synchronous counters, Design of a Synchronous Mod-6 Counter using clocked JK Flip-Flops Design of a Synchronous Mod-6 Counter using clocked D, T, or SR Flip-Flops

UNIT 7:

Sequential Design - I: Introduction, Mealy and Moore Models, State Machine Notation, Synchronous Sequential Circuit Analysis,

UNIT 8:

Sequential Design - II: Construction of state Diagrams, Counter Design

TEXT BOOKS:

1. **"Digital Logic Applications and Design"**, John M Yarbrough, Thomson Learning, 2001.
2. **"Digital Principles and Design ",** Donald D Givone, Tata McGraw Hill Edition, 2002.

REFERENCE BOOKS:

1. **"Fundamentals of logic design",** Charles H Roth, Jr; Thomson Learning, 2004.
2. **"Logic and computer design Fundamentals",** Mono and Kim, Pearson, Second edition, 2001.

3. **"Logic Design",** Sudhakar Samuel, Pearson/Saguine, 2007

NETWORK ANALYSIS
(Common to EC/TC/EE/IT/BM/ML)

Sub Code	**:**	**10ES34**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT 1:
Basic Concepts: Practical sources, Source transformations, Network reduction using Star – Delta transformation, Loop and node analysis With linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh.

UNIT 2:
Network Topology: Graph of a network, Concept of tree and co-tree, incidence matrix, tie-set, tie-set and cut-set schedules, Formulation of equilibrium equations in matrix form, Solution of resistive networks, Principle of duality**.**

UNIT 3:
Network Theorems – 1: Superposition, Reciprocity and Millman's theorems.

UNIT 4:
Network Theorems - II:
Thevinin's and Norton's theorems; Maximum Power transfer theorem

PART – B

UNIT 5: Resonant Circuits: Series and parallel resonance, frequency-response of series and Parallel circuits, Q –factor, Bandwidth.

UNIT 6:
Transient behavior and initial conditions: Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations.

UNIT 7:
Laplace Transformation & Applications : Solution of networks, step, ramp and impulse responses, waveform Synthesis

UNIT 8:
Two port network parameters: Definition of z, y, h and transmission parameters, modeling with these parameters, relationship between parameters

sets.

TEXT BOOKS:

1. **"Network Analysis",** M. E. Van Valkenburg, PHI / Pearson Education, 3rd Edition. Reprint 2002.
2. **"Networks and systems",** Roy Choudhury, 2nd edition, 2006 re-print, New Age International Publications.

REFERENCE BOOKS:

1. **"Engineering Circuit Analysis",** Hayt, Kemmerly and DurbinTMH 6th Edition, 2002
2. **"Analysis of Linear Systems"**, David K. Cheng, Narosa Publishing House, 11th reprint, 2002

ELECTRONIC INSTRUMENTATION
(Common to EC/TC/IT/BM/ML)

Sub Code	**:**	**10IT35**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT – 1:

Introduction

(a) Measurement Errors: Gross errors and systematic errors, Absolute and relative errors, Accuracy, Precision, Resolution and Significant figures.

(b) Voltmeters and Multimeters Introduction, Multirange voltmeter, Extending voltmeter ranges, Loading, AC voltmeter using Rectifiers – Half wave and full wave, Peak responding and True RMS voltmeters.

UNIT – 2:

Digital Instruments

Digital Voltmeters – Introduction, DVM's based on V – T, V – F and Successive approximation principles, Resolution and sensitivity, General specifications, Digital Multi-meters, Digital frequency meters, Digital measurement of time.

UNIT – 3:

Oscilloscopes

Introduction, Basic principles, CRT features, Block diagram and working of each block, Typical CRT connections, Dual beam and dual trace CROs, Electronic switch.

UNIT – 4:
Special Oscilloscopes
Delayed time-base oscilloscopes, Analog storage, Sampling and Digital storage oscilloscopes.

PART – B

UNIT – 5:
Signal Generators
Introduction, Fixed and variable AF oscillator, Standard signal generator, Laboratory type signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator, Frequency synthesizer.

UNIT – 6:
Measurement of resistance, inductance and capacitance
Whetstone's bridge, Kelvin Bridge; AC bridges, Capacitance Comparison Bridge, Maxwell's bridge, Wein's bridge, Wagner's earth connection

UNIT – 7:
Transducers - I
Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor, Inductive transducer, Differential output transducers and LVDT.

UNIT – 8:
Miscellaneous Topics
(a) Transducers - II –Piezoelectric transducer, Photoelectric transducer, Photovoltaic transducer, Semiconductor photo devices, Temperature transducers-RTD, Thermocouple .
(b) Display devices: Digital display system, classification of display, Display devices, LEDs, LCD displays.
(c) Bolometer and RF power measurement using Bolometer
(d) Introduction to Signal conditioning.

TEXT BOOKS:
1. **"Electronic Instrumentation",** H. S. Kalsi, TMH, 2004
2. **"Electronic Instrumentation and Measurements",** David A Bell, PHI / Pearson Education, 2006.

REFERENCE BOOKS:

1. **"Principles of measurement systems",** John P. Beately, 3rd Edition, Pearson Education, 2000
2. **"Modern electronic instrumentation and measuring techniques",** Cooper D & A D Helfrick, PHI, 1998.
3. **Electronics & electrical measurements,** A K Sawhney, , Dhanpat Rai & sons, 9th edition.

INSTRUMENT TRANSUDCERS

Sub Code	**:**	**10IT36**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT 1:

INTRODUCTION:

Definition of a transducer, Block Diagram, Active and Passive Transducers, Primary and Secondary Transducers, Advantages of Electrical Transducers, Selection of Transducers.

04 Hours

UNIT 2:

RESISTIVE TRANSDUCERS:

Potentiometers: Characteristics, loading effect, Linearity & sensitivity, Materials used for potentiometers, advantages & disadvantages of Resistive potentiometers. **strain gauge:** theory, Types, Applications, Thermistors, RTD, Thin Film Sensors, problems.

08 Hours

UNIT 3:

CAPACITIVE TRANSDUCERS:

Capacitive Transducers using change in area of plates, distance between plates, & change of dielectric constants, Linearity by differential arrangement, frequency response, advantages, disadvantages & applications of Capacitive Transducers. **Piezo-electric Transducers:** Principles of operation, expression for output voltage, piezo-electric materials, equivalent circuit, Loading effect, charge Amplifier, frequency response, Applications, and problems.

08 Hours

UNIT 4:

VARIABLE INDUCTANCE TRANSDUCER:
Linear variable differential Transformer (**LVDT**): Principles, characteristics, advantages, disadvantages, applications and problems

06 Hours

PART – B

UNIT 5:
STATIC CHARACTERISTICS OF INSTRUMENTS:
Definition, Static Calibration, True Value, Static Error & correction, Scale Range and Span, Reproducibility, Drift, Repeatability, accuracy & Precision, linearity, Hysteresis, Threshold, Dead time & Dead zone, Resolution & Discrimination, Problems.

08 Hours

UNIT 6:
DYNAMIC CHARACTERISTICS OF INSTRUMENTS:
Definition, Speed of Response, measuring lag, Fidelity, Dynamic Error, dead time, Frequency response of 1^{st} & 2^{nd} order Systems, Correlation between time and Frequency response of 2^{nd} Order Instruments, Problems.

06 Hours

UNIT 7:
TIME DOMAIN ANALYSIS:
Zero Order Instruments, 1^{st} & 2^{nd} Order Instruments – Step, ramp, & Impulse Responses, Time Domain Specifications: Rise time, Settling Time, Peak Overshoot, & Settling time, Problems.

06Hours

UNIT 8:
SPECIAL TRANSDUCERS:
Hall Effect Transducers, Principles & Applications. **Magnetostrictive** Transducers: Characteristics & applications. **Opto–Electronic** Transducers: Photo Voltaic & Photo conductive Cells, Photo Diode & Photo Transistor - Characteristics & applications. Digital transducers and Smart transducers: Principles & Applications.

06Hours

Text Book:-
Electrical & Electronic Measurements & Instrumentation, A.K. Sawhney.

Reference Books:-

1. **Instrument Transducers**, H.K.P. Neubert.
2. **Handbook of Transducers,** H.N. Norton.
3. **Instrumentation In scientific Research**, K.S. Lion.

ANALOG ELECTRONICS LAB
(Common to EC/TC/EE/IT/BM/ML)

Sub Code	**:**	**10ESL37**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**03**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**		**Exam Marks**	**:**	**50**

1. Wiring of RC coupled Single stage FET & BJT amplifier and determination of the gain-frequency response, input and output impedances.

2. Wiring of BJT Darlington Emitter follower with and without bootstrapping and determination of the gain, input and output impedances (Single circuit) (One Experiment)

3. Wiring of a two stage BJT Voltage series feed back amplifier and determination of the gain, Frequency response, input and output impedances with and without feedback (One Experiment)

4. Wiring and Testing for the performance of BJT-RC Phase shift Oscillator for $f_0 \leq 10$ KHz

5. Testing for the performance of BJT – Hartley & Colpitts Oscillators for RF range $f_0 \geq 100$KHz.

6. Testing for the performance of BJT -Crystal Oscillator for $f_0 > 100$ KHz
7 Testing of Diode clipping (Single/Double ended) circuits for peak clipping, peak detection

8. Testing of Clamping circuits: positive clamping /negative clamping.
9. Testing of a transformer less Class – B push pull power amplifier and determination of its conversion efficiency.

10. Testing of Half wave, Full wave and Bridge Rectifier circuits with and without Capacitor filter. Determination of ripple factor, regulation and efficiency

11. Verification of Thevinin's Theorem and Maximum Power Transfer theorem for DC Circuits.

12. Characteristics of Series and Parallel resonant circuits.

LOGIC DESIGN LAB
(Common to EC/TC/EE/IT/BM/ML)

Sub Code	**:**	**10ESL38**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**03**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**		**Exam Marks**	**:**	**50**

1. Simplification, realization of Boolean expressions using logic gates/Universal gates.
2. Realization of Half/Full adder and Half/Full Subtractors using logic gates.
3. (i) Realization of parallel adder/Subtractors using 7483 chip
   (ii) BCD to Excess-3 code conversion and vice versa.
4. Realization of Binary to Gray code conversion and vice versa
5. MUX/DEMUX – use of 74153, 74139 for arithmetic circuits and code converter.
6. Realization of One/Two bit comparator and study of 7485 magnitude comparator.
7. Use of a) Decoder chip to drive LED display and b) Priority encoder.
8. Truth table verification of Flip-Flops: (i) JK Master slave (ii) T type and (iii) D type.
9. Realization of 3 bit counters as a sequential circuit and MOD – N counter design (7476, 7490, 74192, 74193).
10. Shift left; Shift right, SIPO, SISO, PISO, PIPO operations using 74S95.
11. Wiring and testing Ring counter/Johnson counter.
12. Wiring and testing of Sequence generator.

ENGINEERING MATHEMATICS – III

CODE: 10 MAT 31 **IA Marks: 25**
Hrs/Week: 04 **Exam Hrs: 03**
Total Hrs: 52 **Exam Marks:100**

PART-A

Unit-I: FOURIER SERIES

Convergence and divergence of infinite series of positive terms, definition and illustrative examples* Periodic functions, Dirichlet's conditions, Fourier series of periodic functions of period 2π and arbitrary period, half range Fourier series. Complex form of Fourier Series. Practical harmonic analysis.

[7 hours]

Unit-II: FOURIER TRANSFORMS

Infinite Fourier transform, Fourier Sine and Cosine transforms, properties, Inverse transforms

[6 hours]

Unit-III: APPLICATIONS OF PDE

Various possible solutions of one dimensional wave and heat equations, two dimensional Laplace's equation by the method of separation of variables, Solution of all these equations with specified boundary conditions. D'Alembert's solution of one dimensional wave equation.

[6 hours]

Unit-IV: CURVE FITTING AND OPTIMIZATION

Curve fitting by the method of least squares- Fitting of curves of the form

Optimization: Linear programming, mathematical formulation of linear programming problem (LPP), Graphical method and simplex method.

[7 hours]

PART-B

Unit-V: NUMERICAL METHODS - 1

Numerical Solution of algebraic and transcendental equations: Regula-falsi method, Newton - Raphson method. Iterative methods of solution of a system of equations: Gauss-seidel and Relaxation methods.

Largest eigen value and the corresponding eigen vector by Rayleigh's power method.

[6 hours]

Unit-VI: NUMERICAL METHODS – 2

Finite differences: Forward and backward differences, Newton's forward and backward interpolation formulae. Divided differences - Newton's divided difference formula, Lagrange's interpolation formula and inverse interpolation formula.

Numerical integration: Simpson's one-third, three-eighth and Weddle's rules (All formulae/rules without proof)

[7 hours]

Unit-VII: NUMERICAL METHODS – 3

Numerical solutions of PDE – finite difference approximation to derivatives, Numerical solution of two dimensional Laplace's equation, one dimensional heat and wave equations

[7 hours]

Unit-VIII: DIFFERENCE EQUATIONS AND Z-TRANSFORMS

Difference equations: Basic definition; Z-transforms – definition, standard Z-transforms, damping rule, shifting rule, initial value and final value theorems. Inverse Z-transform. Application of Z-transforms to solve difference equations.

[6 hours]

Note: * In the case of illustrative examples, questions are not to be set.

Text Books:

3. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers
4. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

Reference Book:

3. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
4. Peter V. O'Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd.Publishers

MICROCONTROLLERS
(Common to EC/TC/EE/IT/BM/ML)

Sub Code	**:**	**10ES42**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT 1:
Microprocessors and microcontroller. Introduction, Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture, Computer software.
The 8051 Architecture: Introduction, Architecture of 8051, Pin diagram of 8051, Memory organization, External Memory interfacing, Stacks.

UNIT 2:
Addressing Modes: Introduction, Instruction syntax, Data types, Subroutines, Addressing modes: Immediate addressing , Register addressing, Direct

addressing, Indirect addressing, relative addressing, Absolute addressing, Long addressing, Indexed addressing, Bit inherent addressing, bit direct addressing.
Instruction set: Instruction timings, 8051 instructions: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction.

UNIT 3:
8051 programming: Assembler directives, Assembly language programs and Time delay calculations.

UNIT 4:
8051 Interfacing and Applications: Basics of I/O concepts, I/O Port Operation, Interfacing 8051 to LCD, Keyboard, parallel and serial ADC, DAC, Stepper motor interfacing and DC motor interfacing and programming

PART – B

UNIT 5:
8051 Interrupts and Timers/counters: Basics of interrupts, 8051 interrupt structure, Timers and Counters, 8051 timers/counters, programming 8051 timers in assembly and C .

UNIT 6:
8051 Serial Communication: Data communication, Basics of Serial Data Communication, 8051 Serial Communication, connections to RS-232, Serial communication Programming in assembly and C.
8255A Programmable Peripheral Interface:, Architecture of 8255A, I/O addressing,, I/O devices interfacing with 8051 using 8255A.

Course Aim – The MSP430 microcontroller is ideally suited for development of low-power embedded systems that must run on batteries for many years. There are also applications where MSP430 microcontroller must operate on energy harvested from the environment. This is possible due to the ultra-low power operation of MSP430 and the fact that it provides a complete system solution including a RISC CPU, flash memory, on-chip data converters and on-chip peripherals.

UNIT 7:
Motivation for MSP430microcontrollers – Low Power embedded systems, On-chip peripherals (analog and digital), low-power RF capabilities. Target applications (Single-chip, low cost, low power, high performance system design).

MSP430 RISC CPU architecture, Compiler-friendly features, Instruction set, Clock system, Memory subsystem. Key differentiating factors between different MSP430 families.
Introduction to Code Composer Studio (CCS v4). Understanding how to use CCS for Assembly, C, Assembly+C projects for MSP430 microcontrollers. Interrupt programming.
Digital I/O – I/O ports programming using C and assembly, Understanding the muxing scheme of the MSP430 pins.

UNIT 8:
On-chip peripherals. Watchdog Timer, Comparator, Op-Amp, Basic Timer, Real Time Clock (RTC), ADC, DAC, SD16, LCD, DMA.
Using the Low-power features of MSP430. Clock system, low-power modes, Clock request feature, Low-power programming and Interrupt.
Interfacing LED, LCD, External memory. Seven segment LED modules interfacing. Example – Real-time clock.
Case Studies of applications of MSP430 - Data acquisition system, Wired Sensor network, Wireless sensor network with Chipcon RF interfaces.

TEXT BOOKS:

1. **"The 8051 Microcontroller and Embedded Systems – using assembly and C "-,** Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2006 / Pearson, 2006
2. **"MSP430 Microcontroller Basics",** John Davies, Elsevier, 2008.

REFERENCE BOOKS:

1. **"The 8051 Microcontroller Architecture, Programming & Applications",** 2e Kenneth J. Ayala ;, Penram International, 1996 / Thomson Learning 2005.
2. "**The 8051 Microcontroller: Hardware, software and applications**", V.Udayashankara and MalikarjunaSwamy, TMH, 2009
3. **MSP430 Teaching CD-ROM,** Texas Instruments, 2008 (can be requested **http://www.uniti.in**)
4. **Microcontrollers: Architecture, Programming, Interfacing and System Design",Raj Kamal, "Pearson Education, 2005**

CONTROL SYSTEMS
(Common to EC/TC/EE/IT/BM/ML)

Sub Code	**:**	**10ES43**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT 1:

Modeling of Systems: Introduction to Control Systems, Types of Control Systems, Effect of Feedback Systems, Differential equation of Physical Systems -Mechanical systems, Friction, Translational systems (Mechanical accelerometer, systems excluded), Rotational systems, Gear trains, Electrical systems, Analogous systems

UNIT 2:

Block diagrams and signal flow graphs: Transfer functions, Block diagram algebra, Signal Flow graphs (State variable formulation excluded),

UNIT 3:

Time Response of feed back control systems: Standard test signals, Unit step response of First and second order systems, Time response specifications, Time response specifications of second order systems, steady – state errors and error constants. Introduction to PID Controllers(excluding design)

UNIT 4:

Stability analysis: Concepts of stability, Necessary conditions for Stability, Routh- stability criterion, Relative stability analysis; More on the Routh stability criterion.

PART – B

UNIT 5:

Root–Locus Techniques: Introduction, The root locus concepts, Construction of root loci.

UNIT 6:

Frequency domain analysis: Correlation between time and frequency response, Bode plots, Experimental determination of transfer functions, Assessment of relative stability using Bode Plots. Introduction to lead, lag and lead-lag compensating networks (excluding design).

UNIT 7:

Stability in the frequency domain: Introduction to Polar Plots, (Inverse Polar Plots excluded) Mathematical preliminaries, Nyquist Stability criterion, Assessment of relative stability using Nyquist criterion, (Systems with transportation lag excluded).

UNIT 8:

Introduction to State variable analysis: Concepts of state, state variable and state models for electrical systems, Solution of state equations.

TEXT BOOK :

1. J. Nagarath and M.Gopal, "Control Systems Engineering", New Age International (P) Limited, Publishers, Fourth edition – 2005

REFERENCE BOOKS:

1. **"Modern Control Engineering ",** K. Ogata, Pearson Education Asia/ PHI, 4th Edition, 2002.
2. **"Automatic Control Systems",** Benjamin C. Kuo and Farid Golnaagi, Wiley Studnt 8th Edition, 2009
3. **"Feedback and Control System",** Joseph J Distefano III et al., Schaum's Outlines, TMH, 2nd Edition 2007.

SIGNALS & SYSTEMS
(Common to EC/TC/IT/ML)

Sub Code	**:**	**10EC44**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT 1:

Introduction: Definitions of a signal and a system, classification of signals, basic Operations on signals, elementary signals, Systems viewed as Interconnections of operations, properties of systems.

UNIT 2:

Time-domain representations for LTI systems – 1: Convolution, impulse response representation, Convolution Sum and Convolution Integral.

UNIT 3:

Time-domain representations for LTI systems – 2: properties of impulse response representation, Differential and difference equation Representations, Block diagram representations.

UNIT 4:

Fourier representation for signals – 1: Introduction, Discrete time and continuous time Fourier series (derivation of series excluded) and their properties .

PART – B

UNIT 5:

Fourier representation for signals – 2: Discrete and continuous Fourier transforms(derivations of transforms are excluded) and their properties.

UNIT 6:

Applications of Fourier representations: Introduction, Frequency response of LTI systems, Fourier transform representation of periodic signals, Fourier transform representation of discrete time signals

UNIT 7:

Z-Transforms – 1: Introduction, Z – transform, properties of ROC, properties of Z – transforms, inversion of Z – transforms.

UNIT 8:

Z-transforms – 2: Transform analysis of LTI Systems, unilateral Z-Transform and its application to solve difference equations.

TEXT BOOK

Simon Haykin and Barry Van Veen "Signals and Systems", John Wiley & Sons, 2001.Reprint 2002

REFERENCE BOOKS:

1. **Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab,** "Signals and Systems" Pearson Education Asia / PHI, 2nd edition, 1997. Indian Reprint 2002
2. **H. P Hsu, R. Ranjan**, "Signals and Systems", Scham's outlines, TMH, 2006
3. **B. P. Lathi**, "Linear Systems and Signals", Oxford University Press, 2005
4. **Ganesh Rao and Satish Tunga**, "Signals and Systems", Pearson/Sanguine Technical Publishers, 2004

FUNDAMENTALS OF HDL
(Common to EC/TC/IT/BM/ML)

Sub Code	**:**	**10EC45**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT 1:

Introduction: Why HDL? , A Brief History of HDL, Structure of HDL Module, Operators, Data types, Types of Descriptions, simulation and synthesis, Brief comparison of VHDL and Verilog

UNIT 2:

Data –Flow Descriptions: Highlights of Data-Flow Descriptions, Structure of Data-Flow Description, Data Type – Vectors.

UNIT 3:
Behavioral Descriptions: Behavioral Description highlights, structure of HDL behavioral Description, The VHDL variable –Assignment Statement, sequential statements.

UNIT 4:
Structural Descriptions: Highlights of structural Description, Organization of the structural Descriptions, Binding, state Machines, Generate, Generic, and Parameter statements. **PART – B**

UNIT 5: Procedures, Tasks, and Functions: Highlights of Procedures, tasks, and Functions, Procedures and tasks, Functions.
Advanced HDL Descriptions: File Processing, Examples of File Processing

UNIT 6:
Mixed –Type Descriptions: Why Mixed-Type Description? VHDL User-Defined Types, VHDL Packages, Mixed-Type Description examples

UNIT 7:
Mixed –Language Descriptions: Highlights of Mixed-Language Description, How to invoke One language from the Other, Mixed-language Description Examples, Limitations of Mixed-Language Description.
UNIT 8:
Synthesis Basics: Highlights of Synthesis, Synthesis information from Entity and Module, Mapping Process and Always in the Hardware Domain.

TEXT BOOKS:
1. **HDL Programming (VHDL and Verilog**)- Nazeih M.Botros- Dreamtech Press, (Available through John Wiley – India and Thomson Learning) 2006 Edition

REFERENCE BOOKS:
1. **Verilog HDL** –Samir Palnitkar-Pearson Education
2. **VHDL** -Douglas perry-Tata McGraw-Hill
3. **A Verilog HDL Primer**- J.Bhaskar – BS Publications
4. **Circuit Design with VHDL**-Volnei A.Pedroni-PHI

LINEAR IC's & APPLICATIONS
(Common to EC/TC/IT/BM/ML)

Sub Code	**:**	**10EC46**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**04**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**52**	**Exam Marks**	**:**	**100**

PART – A

UNIT 1:

Operational Amplifier Fundamentals: Basic Op-Amp circuit, Op-Amp parameters – Input and output voltage, CMRR and PSRR, offset voltages and currents, Input and output impedances, Slew rate and Frequency limitations; Op-Amps as DC Amplifiers- Biasing Op-Amps, Direct coupled -Voltage Followers, Non-inverting Amplifiers, Inverting amplifiers, Summing amplifiers, Difference amplifier.

UNIT 2:

Op-Amps as AC Amplifiers: Capacitor coupled Voltage Follower, High input impedance - Capacitor coupled Voltage Follower, Capacitor coupled Non-inverting Amplifiers, High input impedance - Capacitor coupled Non-inverting Amplifiers, Capacitor coupled Inverting amplifiers, setting the upper cut-off frequency, Capacitor coupled Difference amplifier, Use of a single polarity power supply.

UNIT 3:

Op-Amps frequency response and compensation: Circuit stability, Frequency and phase response, Frequency compensating methods, Band width, Slew rate effects, Z_{in} Mod compensation, and circuit stability precautions.

UNIT 4:

OP-AMP Applications: Voltage sources, current sources and current sinks, Current amplifiers, instrumentation amplifier, precision rectifiers, Limiting circuits.

PART – B

UNIT 5:

More applications: Clamping circuits, Peak detectors, sample and hold circuits, V to I and I to V converters, Log and antilog amplifiers, Multiplier and divider, Triangular / rectangular wave generators, Wave form generator design, phase shift oscillator, Wein bridge oscillator.

UNIT 6:

Non-linear circuit applications: crossing detectors, inverting Schmitt trigger circuits, Monostable & Astable multivibrator, Active Filters –First and second order Low pass & High pass filters.

UNIT 7:

Voltage Regulators: Introduction, Series Op-Amp regulator, IC Voltage regulators, 723 general purpose regulator, Switching regulator.

UNIT 8:

Other Linear IC applications: 555 timer - Basic timer circuit, 555 timer used as astable and monostable multivibrator, Schmitt trigger; PLL-operating principles, Phase detector / comparator, VCO; D/A and A/ D converters – Basic DAC Techniques, AD converters.

TEXT BOOKS:

1. **"Operational Amplifiers and Linear IC's",** David A. Bell**,** 2nd edition, PHI/Pearson, 2004
2. **"Linear Integrated Circuits",** D. Roy Choudhury and Shail B. Jain**,** 2nd edition, Reprint 2006, New Age International

REFERENCE BOOKS:

1. **"Op - Amps and Linear Integrated Circuits",** Ramakant A. Gayakwad, 4th edition, PHI,
2. **"Operational Amplifiers and Linear Integrated Circuits",** Robert. F. Coughlin & Fred.F. Driscoll**,** PHI/Pearson, 2006
3. **"Op - Amps and Linear Integrated Circuits",** James M. Fiore**,** Thomson Learning, 2001
4. **"Design with Operational Amplifiers and Analog Integrated Circuits",** Sergio Franco**,** TMH, 3e, 2005

MICROCONTROLLERS LAB
(Common to EC/TC/EE/IT/BM/ML)

Sub Code	**:**	**10ESL47**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**03**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**42**	**Exam Marks**	**:**	**50**

I. PROGRAMMING

1. Data Transfer - Block move, Exchange, Sorting, Finding largest element in an array.

2. Arithmetic Instructions - Addition/subtraction, multiplication and division, square, Cube – (16 bits Arithmetic operations – bit addressable).
3. Counters.
4. Boolean & Logical Instructions (Bit manipulations).
5. Conditional CALL & RETURN.
6. Code conversion: BCD – ASCII; ASCII – Decimal; Decimal - ASCII; HEX - Decimal and Decimal - HEX .
7. Programs to generate delay, Programs using serial port and on-Chip timer / counter.

Note: Programming exercise is to be done on both 8051 & MSP430.

II. INTERFACING:

Write C programs to interface 8051 chip to Interfacing modules to develop single chip solutions.

8. Simple Calculator using 6 digit seven segment display and Hex Keyboard interface to 8051.
9. Alphanumeric LCD panel and Hex keypad input interface to 8051.
10. External ADC and Temperature control interface to 8051.
11. Generate different waveforms Sine, Square, Triangular, Ramp etc. using DAC interface to 8051; change the frequency and amplitude.
12. Stepper and DC motor control interface to 8051.
13.. Elevator interface to 8051.

HDL LAB
(Common to EC/TC/IT/BM/ML)

Sub Code	**:**	**10ECL48**	**IA Marks**	**:**	**25**
Hrs/ Week	**:**	**03**	**Exam Hours**	**:**	**03**
Total Hrs.	**:**	**42**	**Exam Marks**	**:**	**50**

Note: Programming can be done using any compiler. Download the programs on a FPGA/CPLD boards such as Apex/Acex/Max/Spartan/Sinfi/TK Base or equivalent and performance testing may be done using 32 channel pattern generator and logic analyzer apart from verification by simulation with tools such as Altera/Modelsim or equivalent.

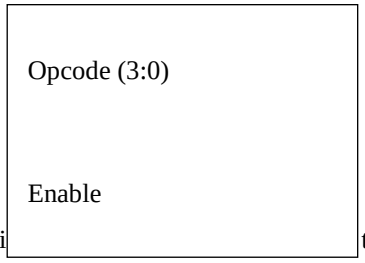
PROGRAMMING (using VHDL and Verilog)

1. Write HDL code to realize all the logic gates
2. Write a HDL program for the following combinational designs
   a. 2 to 4 decoder
   b. 8 to 3 (encoder without priority & with priority)
   c. 8 to 1 multiplexer
   d. 4 bit binary to gray converter
   e. Multiplexer, de-multiplexer, comparator.

2. Write a HDL code to describe the functions of a Full Adder Using three modeling styles.

3. Write a model for 32 bit ALU using the schematic diagram shown below

A (31:0) B (31:0)



- ALU should use combinational logi the four bit op-code input.
- ALU should pass the result to the out bus when enable line in high, and tri-state the out bus when the enable line is low.
- ALU should decode the 4 bit op-code according to the given in example below.

OPCODE	ALU OPERATION
1.	A + B
2.	A – B
3.	A Complement
4.	A * B
5.	A AND B
6.	A OR B
7.	A NAND B
8.	A XOR B

4. Develop the HDL code for the following flip-flops, SR, D, JK, T.
5. Design 4 bit binary, BCD counters (Synchronous reset and Asynchronous reset) and "any sequence" counters

INTERFACING (at least four of the following must be covered using VHDL/Verilog)

1. Write HDL code to display messages on the given seven segment display and LCD and accepting Hex key pad input data.

2. Write HDL code to control speed, direction of DC and Stepper motor.

3. Write HDL code to accept 8 channel Analog signal, Temperature sensors and display the data on LCD panel or Seven segment display.

4. Write HDL code to generate different waveforms (Sine, Square, Triangle, Ramp etc.,) using DAC change the frequency and amplitude.

5. Write HDL code to simulate Elevator operations
6. Write HDL code to control external lights using relays.

V SEMESTER

MANAGEMENT AND ENTERPRENEURSHIP

Subject Code	:	**10AL51**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

MANAGEMENT

UNIT - 1

MANAGEMENT: Introduction – Meaning – nature and characteristics of Management, Scope and Functional areas of management – Management as a science, art of profession – Management & Administration – Roles of Management, Levels of Management, Development of Management Thought – early management approaches – Modern management approaches.

7 Hours

UNIT - 2

PLANNING: Nature, importance and purpose of planning process – Objectives – Types of plans (Meaning Only) – Decision making – Importance of planning – steps in planning & planning premises – Hierarchy of plans.

6 Hours

UNIT - 3

ORGANIZING AND STAFFING: Nature and purpose of organization – Principles of organization – Types of organization – Departmentation – Committees- Centralization Vs Decentralization of authority and responsibility – Span of control – MBO and MBE (Meaning Only) Nature and importance of staffing–Process of Selection & Recruitment (in brief).

6 Hours

UNIT - 4

DIRECTING & CONTROLLING: Meaning and nature of directing – Leadership styles, Motivation Theories, Communication – Meaning and importance – coordination, meaning and importance and Techniques of Co –

Ordination. Meaning and steps in controlling – Essentials of a sound control system – Methods of establishing control (in brief).

7 Hours

PART - B
ENTREPRENEURSHIP

UNIT - 5

ENTREPRENEUR: Meaning of Entrepreneur; Evolution of the Concept, Functions of an Entrepreneur, Types of Entrepreneur, Intrapreneur - an emerging Class. Concept of Entrepreneurship – Evolution of Entrepreneurship, Development of Entrepreneurship; Stages in entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.

6 Hours

UNIT - 6

SMALL SCALE INDUSTRIES: Definition; Characteristics; Need and rationale; Objectives; Scope; role of SSI in Economic Development. Advantages of SSI Steps to start and SSI – Government policy towards SSI; Different Policies of SSI; Government Support for SSI during 5 year plans. Impact of Liberalization, Privatization, Globalization on SSI Effect of WTO/GATT Supporting Agencies of Government for SSI, Meaning, Nature of support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry (Definition Only)

7 Hours

UNIT - 7

INSTITUTIONAL SUPPORT: Different Schemes; TECKSOK; KIADB; KSSIDC; KSIMC; DIC Single Window Agency; SISI; NSIC; SIDBI; KSFC.

7 Hours

UNIT - 8

PREPARATION OF PROJECT: Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; Formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal.

Identification of business opportunities: Market Feasibility Study; Technical Feasibility Study; Financial Feasibility Study & Social Feasibility Study.

7 Hours

TEXT BOOKS:

1. **Principles of Management** – P.C.Tripathi, P.N.Reddy – Tata McGraw Hill,
2. **Dynamics of Entrepreneurial Development & Management** – Vasant Desai – Himalaya Publishing House
3. **Entrepreneurship Development** – Poornima.M.Charantimath – Small Business Enterprises – Pearson Education – 2006 (2 & 4).

REFERENCE BOOKS:

1. **Management Fundamentals** – Concepts, Application, Skill Development – Robers Lusier – Thomson –
2. **Entrepreneurship Development** – S.S.Khanka – S.Chand & Co.
3. **Management** – Stephen Robbins – Pearson Education/PHI – 17th Edition, 2003.

ADVANCED MICROPROCESSOR & PERIPHERALS

Subject Code	:	**10IT52**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

Introduction, Microprocessor based computer system, Architecture of 8086 Microprocessor, Pin functions, Clock generator, Minimum /Maximum mode of operation.

7 Hours

UNIT - 2

Read /Write Timing diagrams, 8086 instruction set, Instruction template for data transfer instruction, addressing modes.

7 Hours

UNIT - 3

Assembler directives, Programming examples.

6 Hours

UNIT - 4

Linking and relocation, Stacks, Procedures, Interrupt and Interrupt routines, Macros.

6 Hours

PART - B

UNIT - 5

DOS interrupt 21H function to read a character from keyboard, Write character to console, Creation of a new file, read/write from/ to file, Serial/parallel communication.

Interfacing devices, Memory devices and Interfacing

7 Hours

UNIT - 6

8255PPI device and interfacing, Keyboard, display, ADC, DAC, Stepper motor and Printer interfacing using 8255.

7 Hours

UNIT - 7

8279 programmable keyboard/display controller and interfacing, 8253 and interfacing, 8259 programmable interrupt controller and interfacing

6 Hours

UNIT - 8

8257 DMA controller and interfacing, serial communication using 8251 & 8087 Numeric data processor and interfacing, RS 232 serial communication standards.

6 Hours

TEXTBOOKS:

1 **Advanced Microprocessor and Peripherals**- A.K.Ray and K.M. Bhurchandi, Tata McGraw Hill.

2 **Microcomputer systems 8086/8088 family, Architecture, Programming and Design -** Yu-Cheng Liu & Glenn A Gibson, 2nd Edition- July 2003, Prentice Hall of India.

REFERENCE BOOKS:

1. **Microprocessor and Interfacing, Programming & Hardware-** Douglas V Hall, 2nd Edition, Tata McGraw Hill
2. **Microprocessor Architecture, Programming and Applications with the 8085-** Ramesh S Gaonkar, 4th Edition, Penram International.

DIGITAL SIGNAL PROCESSING

Subject Code	:	**10IT53**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

Review of discrete signal and systems, DFT, IDFT, Properties of DFT

7 Hours

UNIT - 2

COMPUTATION OF FFT: Radix-2 Decimation in Time FFT, Radix-2 Decimation in Frequency FFT, Inverse FFT Algorithm.

6 Hours

UNIT – 3

DIGITAL FILTER STRUCTURES: Basic IIR Filter Structures: Direct forms (I & II), cascade and parallel realizations, Basic FIR filter structures-Direct & cascade form structure. **6 Hours**

UNIT – 4

FIR FILTERS: Properties, Filter Design using Windows (Rectangular, Hamming, Hanning and Kaiser Window), FIR Filter design using Frequency sampling technique.

7 Hours

PART - B

UNIT – 5 &6

IIR FILTERS: Specification and design techniques, Impulse Invariant and Bilinear Transformation techniques. Design of digital Butterworth and Chebyshev low pass filters using Analog filter design techniques, Transform of Low pass to High pass, Band pass and Band rejection filters, Comparison of IIR and FIR filters

14 Hours

UNIT – 7

MULTIRATE DIGITAL SIGNAL PROCESSING: Introduction, Decimation by a factor D, Interpolation by a factor I, Applications of multirate signal processing: Interfacing of digital systems with different sampling rate, Implementation of Digital filter banks, DFT filter banks, Quadrature Mirror filter banks.

6 Hours

UNIT- 8

ADAPTIVE FILTERS: Adaptive filters, LMS adaptive algorithms, Recursive least square algorithms, Applications of Adaptive filters.

6Hours

TEXT BOOKS:

1. **Digital Signal Processing-** PROAKIS and MANOLAKIS, 3rd Edition, Prentice Hall of India / Pearson.
2. **Real Time Digital Signal Processing: Fundamentals, Algorithms and implementation using TMS Processor**-V.Udayashankara, Prentice Hall of India, New Delhi, 2010

REFERENCE BOOKS:

1. **Digital Signal Processing**- S K MITRA, 4th Edition, Mc Graw-Hill.
2. **Theory and Application of DSP**- RABINAR L R and GOLD B, Prentice Hall of India, 1999.
3. **Introduction to digital signal processing-** JOHNSON, Prentice Hall of India 1999.
4. **Digital Signal Processing-**ALAN V OPPENHEIM, Prentice Hall of India.

PROCESS INSTRUMENTATION

Subject Code	:	**10IT54**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

GENERALIZED CONFIGURATION, FUNCTIONAL DESCRIPTION & PERFORMANCE CHARACTERISTICS OF MEASURING INSTRUMENTS: Functional elements of an instrument: analog & digital modes of operation: null & deflection methods: I/O configuration of measuring instruments & instrument system- methods of correction for interfering & modifying inputs. Measurement Of Displacement: Principle of measurement of displacement, resistive potentiometers, variable inductance & variable reluctance pickups, LVDT, capacitance pickup.

7 Hours

UNIT - 2

MEASUREMENT OF FORCE, TORQUE & SHAFT POWER: Principle of measurement of Force, Torque, Shaft power standards and calibration: basic methods of force measurement; characteristics of elastic force transducer- Bonded strain gauge, differential transformer, piezo electric transducer, variable reluctance/ FM- Oscillator digital systems, loading effects; torque measurement on rotating shafts, shaft power measurement (dynamometers).

6 Hours

UNIT - 3

TEMPERATURE MEASUREMENT: Standards & calibration: thermal expansion methods-bimetallic thermometers, liquid-in-glass thermometers, pressure thermometers; thermoelectric sensor (thermocouple)- common thermocouples, reference junction consideration, special materials, configuration & techniques; electrical resistance sensors- conductive sensor (resistance thermometers), bulk semiconductors sensors (thermistors); junction semiconductor sensors; digital thermometers.

6 Hours

UNIT - 4

RADIATION METHODS: radiation fundamentals, radiation detectors, unchopped (DC) broadband radiation thermometers, Chopped (AC) selective band (photon) radiation thermometers, automatic null balance radiation thermometers (optical pyrometers). Two colour radiation thermometers, Black body-tipper fiber optic radiation thermometer. IR imaging systems. Fluroptic temperature measurement.

7 Hours

PART - B

UNIT - 5

PRESSURE MEASUREMENT: Standards & calibration: basic methods of pressure measurement; dead weight gauges & manometer, manometer dynamics; elastic transducers, high pressure measurement; low pressure (vacuum) measurement- McLeod gauge, Knudsen gauge, momentum-transfer (viscosity) gauges, thermal conductivity gauges, ionization gauges, dual gauge technique.

7 Hours

UNIT - 6

FLOW MEASUREMENT: Local flow velocity, magnitude and direction. Flow visualization. Velocity magnitude from pitot static tube. Velocity direction from yaw tube, pivoted vane, servoed sphere, dynamic wind vector indicator. Hot wire and hot film anemometer. Hot film shock-tube velocity sensors.

6 Hours

UNIT - 7

LASER DOPPLER VELOCIMETER; gross volume flow rate; calibration and standards. Constant-area, variable-pressure-drop meters (obstruction meters). Averaging pitot tubes. Constant pressure-drop, variable area meters (Rotameters), turbine meters, positive displacement meters. Metering pumps. Electromagnetic flow meters. Drag force flow meters. Ultrasonic flow meters, vortex-shedding flow meters.

6 Hours

UNIT - 8

LEVEL MEASUREMENT: Capacitance probe; conductivity probes; diaphragm level detector, differential pressure level detector, radiation level sensors, level transmitter, ultrasonic level detector.

7 Hours

TEXT BOOKS:

1. **Measurement systems application and design-** ERNEST O DOEBELIN, 5th Edition Tata McGraw Hill.
2. **Instrument Engineers Hand book-**(process measurement) B G LIPTAK, Chilton book Company.

REFERENCE BOOKS:

1. **Instrumentation Devices & Systems**- Rangan, Mani and Sharma 2nd Edition, Tata McGraw Hill.
2. **Process Instruments & Controls Hand Book Considine**- D.M. Mc Graw Hill.
3. **Transducers & Instrumentation**- DVS Murthy, Prentice Hall of India.
4. **Instrumentation & Process Measurements**- W.Bolton, Universities Press.

BIOMEDICAL INSTRUMENTATION

Subject Code	:	**10IT55**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

FUNDAMENTALS: Sources of biomedical signals, Basic instrumentation system, General constraints in design of biomedical instrumentation systems

BIOELECTRIC SIGNALS AND ELECTRODES: Origin of bioelectric signals, Types of bioelectric signals, Recording electrodes, Electrode-Tissue interface, Polarization, Skin contact impedance, Silver-silver chloride electrodes, Electrodes for ECG, EEG, EMG, Microelectrodes.

7 Hours

UNIT - 2

ELECTROCARDIOGRAPH: Electrical activity of the heart, Genesis & characteristics of Electrocardiogram (ECG), Block diagram description of an Electrocardiograph, ECG lead system, Multi-channel ECG machine

ELECTROENCEPHALOGRAPH: Genesis of Electroencephalogram (EEG), Block diagram description of an Electroencephalograph, 10-20 electrode systems, and computerized analysis of EEG.

7 Hours

UNIT - 3

PATIENT MONITORING SYSTEM: Bedside patient monitoring systems, Central monitors, Measurement of heart rate – Average heart rate meter, Instantaneous heart rate meter (cardio tachometer), Measurement of pulse rate.

6 Hours

UNIT - 4

BLOOD PRESSURE MEASUREMENT : Direct & Indirect method, Automatic blood pressure measuring apparatus using Korotkoff's method,

Rheographic method, Oscillometric method, Ultrasonic Doppler shift method, Measurement of Respiration rate – Thermistor method, Impedance pnuemography, CO2 method, Apnea detectors

6 Hours

PART - B

UNIT - 5

BLOOD FLOW METERS: Electromagnetic blood flow meters, Ultrasonic blood flow meters, NMR blood flow meters, Laser Doppler blood flow meters.

6 Hours

UNIT - 6

CARDIAC OUTPUT MEASUREMENT: Indicator dilution method, Dye dilution method, Thermal dilution techniques, Measurement of continuous cardiac output derived from the aortic pressure waveform, Impedance technique.

6 Hours

UNIT - 7

CARDIAC PACEMAKERS AND DEFIBRILLATORS: Need for cardiac pacemaker, External pacemaker, Implantable pacemaker, Types of Implantable pacemakers, Programmable pacemaker, Rate-responsive pacemakers, AC & DC defibrillators.

7 Hours

UNIT - 8

PULMONARY FUNCTION ANALYZER: Pulmonary function measurement, Spirometry, Pneumotachometer, Measurement of volume by Nitrogen washout technique. Patient Safety: Electric shock hazards, Leakage currents

7 Hours

TEXT BOOK:

1. **Handbook of Biomedical Instrumentation**-R. S. Khandpur, 2nd Edition, 2003, Tata McGraw-Hill.

REFERENCE BOOKS:

1. **Principles of applied biomedical instrumentation-** Lesely Cromwell & others. 2nd Edition, John Wiley and sons.
2. **Encyclopedia of medical devices and instrumentation**-J. G. Webster, John Wiley, 1999.

C++ AND DATA STRUCTURES

Subject Code	:	**10IT56**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

Part - A

UNIT - 1

C++ PROGRAMMING BASICS: Need for object oriented programming, procedural languages, characteristics of OOP, preprocessor directives, data types, manipulators.

6 Hours

UNIT - 2

STRUCTURES: Structures, enumerated data types, Boolean type, Functions: passing arguments, returning values, reference arguments, overloaded functions, inline functions, variable and storage classes.

7 Hours

UNIT - 3

OBJECTS AND CLASSES: objects as data types, constructors, destructors, overloaded constructors. Arrays: Arrays as class member data types, passing arrays, arrays as objects, strings, arrays of strings.

7 Hours

UNIT - 4

OPERATOR OVERLOADING: over loading of unary operators, binary operators, data conversion.

6 Hours

PART - B

UNIT - 5

INHERITANCE: Inheritance, derived class and base class, overriding member functions, scope resolution, levels of inheritance, multiple inheritances.

7 Hours

UNIT - 6

Pointers, pointers to objects, linked list, virtual functions, static functions, files and streams, input/output operations.

7 Hours

UNITS - 7 & 8

DATA STRUCTURES: data representation, matrices, stacks, Queues, skip lists and Hashing, binary trees.

12 Hours

TEXT BOOKS:

1. **Object oriented programming in TURBO C++** -Robert Lafore, Galgotia Publications.2002.
2. **Data Structures, Algorithms and Applications in C++:** Sartaj Sahni, Tata McGrawHill.

REFERENCE BOOKS:

1. **Object Oriented Programming with C++,** E Balaguruswamy, 3rd Edition, Tata McGraw Hill 2006.
2. **C++ the complete reference**, Herbert Schildt, 4th Edition, Tata McGraw Hill, 2003.
3. **Data Structures using C++,** D.S.Malik, Thomson, 2003.

ANALOG IC LAB

Subject Code	:	**10ITL57**	*IA Marks*	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

1. Measurement of Opamp parameters (input offset current, input bias current, slew rate, input offset voltage, PSRR, CMRR) & offset nulling.

2. Inverting amplifier & attenuator, noninverting amplifier& voltage follower.
3. Adder, subtractor, integrator, differentiator,
4. I to V converter & V to I converter.
5. Half wave & full wave precision rectifiers.
6. Design of low-pass filters (Butterworth I & II order).
7. Design of high-pass filters (Butterworth I & II order).
8. Instrumentation amplifier- Design for different gains.
9. RC phase-shift and Wein bridge Oscillators.
10. ZCD, positive voltage level & negative voltage level detectors.
11. Schmitt trigger- design for different hystersis.
12. Design of astable and monostable multivibrator using 555 timer.
13. Low voltage and high voltage regulators using LM723.

Note:

i. Standard design procedure to be adopted.
ii. Students should build the circuit using discrete components and IC's (models are not to be used)

8086 MICROPROCESSOR LAB

Subject Code	:	**10ITL58**	*IA Marks*	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

PART - A

1. Write an assembly language program to find the average of N 16 bit unsigned integers.

2. Write an ALP to find the GCD of two 16 bit unsigned integers.

3. Write an ALP to convert a BCD number to 7-segment code using look-up table.

4. Write an ALP to sort a set of N 16 bit unsigned integers in ascending/ descending order using bubble sort algorithm. Length of numbers N is in location X and the integers start from word location X+1.

5. Write an ALP to read a 4-digit hexadecimal number from keyboard and display on the screen using INT 21H. Implement the same using two PUBLIC procedures.

6. Write an ALP to multiply 2 16 bit number in location in X, X+1 and Y, Y+1 respectively using.
   - Successive addition.
   - Shift method

7. Write an ALP to perform the following.
   - If contents of X=1, then determine Z=(Y+W)/V.
   - If contents of X=0, then determine Z=(Y*W)-V.
   - For other values of X store 00 in location Z, where Y, W, V location contains 16 bit unsigned integers.

8. Write an ALP to check whether the code word is valid or not. The code word is stored in location X. (Example: The code word is valid if 3 MSB's are 0 and two 1's in the remaining bits).

9. Develop and execute an ALP to read a digit hexadecimal number from keyboard and store the corresponding value in a word location.

10. Using conditional assembly develop and execute an ALP with the features. It uses one input value, an unsigned 16 bit integer called X. If EQNI is true, it assembles code which computes 3*X*X+4*X+5 and places 32 bit result in double word memory. Otherwise it assembles code which computes 7*[X**2] +8 and places 32 bit result in double word memory location.

11. Develop and execute ALP that implements Binary search algorithm. The data consists of Sorted 16 bit unsigned integers. The search key is also a 16 bit unsigned integer.

12. Develop and execute an assembly language program to compute factorial of a positive integer number using recursive procedure.

PART - B

1. Generate a square wave using sub port of port C: 8255.

2. Interface a stepper motor and write program to rotate in clock-wise and anti-clock wise direction.

3. Interface a 4×4-matrix keypad and write a program to identify the key.

4. Generate a sine wave of programmable amplitude using DAC interface.

5. Interface an 8-bit ADC and write program to store the converted data in memory location.

6. Using the 8255 in the ADD-ON card realize an 8 to 1 multiplexer.

7. Generate a triangular wave using DAC interface.

8. Implement a programmable up/down 4-bit binary/decade counter using the I/O lines in the add-on card. Provision for selecting up or down, binary or decade counting and loading an initial value is to be provided.

9. Develop and execute an ALP to display 4 digit BCD number on multiplexed display.

10. Interface a 7-segment display and write program to display number from 0 to 9 in succession at regular interval.

11. Interface a printer and write program to print characters.

12. Develop and execute ALP to realize ALU. A&B are n bit input binary to ALU and Y is output. Two control lines X1, X2 decide the operation to be performed.

X1	X2	operation
0	0	ADD
0	1	SUB
1	0	AND
1	1	XOR

VI SEMESTER
COMMUNICATION SYSTEMS

Subject Code	:	**10IT61**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNITS - 1 & 2

AMPLITUDE MODULATION: Time-Domain Description, Frequency domain description, Generation of AM waves, Detection of AM waves, AM/DSB, Time-Domain Description, Frequency domain description Generation of DSBSC waves, Coherent Detection of DSBSC Modulated waves. Costas loop, Quadrature Carrier multiplexing, AM-SSB/SC generation, Frequency-Domain Description, Frequency discrimination method for generation an SSB Modulated wave, time domain description, phase discrimination method for generating an SSB modulated wave, Demodulation of SSB waves, Comparison of amplitude modulation techniques, frequency translation, FDM.

12 Hours

UNIT - 3

ANGLE MODULATION: Basic Concepts, Frequency Modulation, Spectrum Analysis Of sinusoidal FM wave, NBFM, WBFM, Constant Average power, Transmission bandwidth of FM waves, Generation of FM waves, Direct FM, demodulation of FM waves, frequency discriminator, ZCD, phase locked loop (1^{st} order) of AM and FM

7 Hours

UNIT - 4

NOISE IN ANALOG MODULATION SYSTEMS: Signal-to-noise ratios, AM receiver model, Signal-to -noise ratios for coherent reception, DSBSC receiver, SSB receiver, noise in AM receivers using envelope detection, threshold effect, FM receiver model, noise in FM reception, FM threshold effect, pre-emphasis and de-emphasis in FM systems

7 Hours

PART - B

UNITS 5 & 6

PULSE MODULATION: Sampling theorem for low-pass and band-pass signal, statement and proof, PAM, Channel bandwidth for a PAM signal, natural sampling, flat-top sampling, signal recovery though holding, quantization of signals, quantization error, PCM, electrical representations of binary digits, PCM systems, DPCM, delta Modulation, Adaptive delta modulation.

12 Hours

UNITS - 7 & 8

DIGITAL MODULATION: Introduction, Binary Shift Keying, BFSK, spectrum, receiver for BFSK, geometrical representation of orthogonal BFSK, DPSK, QPSK, Type D flip-flop, QPSK transmitter, non-offset QPSK, QPSK receiver, signal - space representation, line codes, TDM.

14 Hours

TEXTBOOKS:

1. **Analog and Digital communication**- Simon Haykin, John Willey.
2. **Principles of communication systems**-Taub and Schilling, Tata McGraw Hill.

REFERENCE BOOKS:

1. **Electronic Communication Systems**- 2nd Edition, Blake, Thomson publishers.
2. **Electronics Communication: Modulation & Transmission- 2nd edition, PHI.**
3. **Electronic Communication Systems**-George Kennedy.

ADVANCED CONTROL SYSTEMS

Subject Code	:	**10IT62**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

REVIEW OF VECTOR MATRIX ANALYSIS. DISCRETE TIME CONTROL SYSTEMS, Z-TRANSFORM METHOD: Introduction to discrete systems, pulse transfer function, stability analysis in the Z-plane.

7 Hours

UNITS - 2 & 3

STATE SPACE ANALYSIS OF CONTROL SYSTEMS: State space representation of systems, solving the time invariant state equations, transfer matrix, linear time invariant systems, state space representation of discrete time systems and solving discrete time state equation.

12 Hours

UNIT - 4

POLE PLACEMENT: Controllability, Observability for continuous time systems, pole placement design and state observers.

7 Hours

PART - B

UNIT - 5

OPTIMAL AND ADAPTIVE CONTROL SYSTEMS: optimal control system based on quadratic performance index, adaptive control system.

6 Hours

UNIT - 6

DESCRIBING FUNCTION ANALYSIS OF NONLINEAR CONTROL SYSTEMS: Introduction to nonlinear systems, describing function analysis of nonlinear control systems, stability of nonlinear control system.

7 Hours

UNITS - 7 & 8

COMPENSATION TECHNIQUES: Lead, lag, lead lag network and compensator design using Bode/Root locus techniques.

13 Hours

TEXT BOOKS:

1. **Modern Control Engineering**-K. Ogata, Prentice 3rd Edition, Hall of India publication.
2. **Discrete time Control Systems**-K.Ogata, 2nd Edition, Prentice Hall of India publication.

REFERENCE BOOKS:

1. **Digital control and state variable methods**-Madan Gopal, 2nd Edition, Prentice Hall of India.
2. **Modern Control Engineering**-Roy Choudhury, Prentice Hall of India.

DIGITAL IMAGE PROCESSING

Subject Code	:	**10IT63**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

FUNDAMENTALS: Introduction, Fundamental steps in digital image processing (DIP), components of DIP system, A simple image formation model, Image sampling and quantization, Basic relationship between pixels, Color image processing fundamentals and models.

6 Hours

UNIT - 2

IMAGE TRANSFORMS: Basic theory, Fourier transforms, Hadamard transform, Discrete cosines transform, Applications of discrete image transforms.

6 Hours

UNIT - 3

IMAGE ENHANCEMENT IN SPATIAL DOMAIN: Background, Point processing – Image negatives, Log transformations, Power law transformations, Contrast stretching, Gray level slicing, Bit plane slicing, Histogram processing – Histogram equalization, Histogram matching (specification), Local enhancement, Arithmetic/Logic operations – Image

subtraction, Image averaging, Basics of spatial filtering, Smoothing spatial filters – Smoothing linear filters, order statistics filters, Sharpening spatial filters – Foundation, Laplacian and gradient.

7 Hours

UNIT - 4

IMAGE ENHANCEMENT IN FREQUENCY DOMAIN: Background, Basic properties of the frequency domain, Basic filtering in the frequency domain, Basic filters and their properties, Smoothing frequency domain filters – Ideal low-pass filters, Butterworth low-pass filters, Gaussian low-pass filters, Sharpening frequency domain filters – Ideal high-pass filters, Butterworth high-pass filters, Gaussian high-pass filters, Homo morphic filtering.

7 Hours

PART - B

UNIT - 5

IMAGE RESTORATION: Image degradation and restoration models, noise models, restoration using spatial filtering – mean filter, geometric mean filter, harmonic mean filter, median filter, max & min filters, midpoint filter.

6 Hours

UNIT - 6

NOISE FILTERING BY FREQUENCY DOMAIN FILTERING – band reject filter, band pass filter, notch filter, inverse filtering, minimum mean square error (Wiener) filtering.

6 Hours

UNIT - 7

IMAGE COMPRESSION: Fundamentals, variable length coding, LZW coding, bit plane coding, constant area coding, run length coding, lossless predictive coding, lossy predictive coding, transform coding, image compression standards :basic, JPEG.

7 Hours

UNIT - 8

IMAGE SEGMENTATION: Introduction, thresholding: threshold detection methods, optimal thresholding, multi-spectral thresholding, edge-based segmentation: edge image thresholding, border tracing, Hough

transform, region-based segmentation: region merging, region splitting, splitting & merging. Matching: matching criteria.

7 Hours

TEXT BOOKS:

1. **Digital Image Processing** - Rafael C. Gonzalez & Richard E. Woods, Second Edition. Pearson Education Inc.
2. **Digital Image Processing, analysis and computer Vision**- First edition, Milan Sonka, Cenage Learning, 2008.

REFERENCE BOOK:

1. **Fundamentals of Digital Image Processing**- Anil K. Jain, 2nd Edition, Prentice Hall of India.
2. **Digital image processing, First edition, S**.Jayaraman, S.Esakkirajan, J.Veerakumar, TMH-2008.

PROCESS CONTROL SYSTEM

Subject Code	:	**10IT64**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNITS - 1

INTRODUCTION TO PROCESS CONTROL: process control block diagram, control system evolution. Final control**:** introduction to final control operation, signal conversions, actuators, control elements**.** Alarm and annunicators, contol drawing: P & ID symbols and diagrams, flow sheet symbols, inter logic symbols, graphic symbols.

7 Hours

UNIT - 2

CONTROLLER PRINCIPLES: Introduction, process characteristics, control system parameters, discontinuous control modes, continuous control modes, and composite control modes.

7 Hours

UNIT - 3

ANALOG CONTROLLERS: Introduction, general features, electronic controllers, pneumatic controllers, designs considerations.

6 Hours

UNIT - 4

DISCRETE-STATE PROCESS CONTROL: Introduction, definition and characteristics of discrete state process control. Control-loop characteristics: Introduction, control system configuration, multivariable control systems, control system quality, stability, and process loop tuning.

6 Hours

PART - B

UNIT - 5

DIGITAL–TO-ANALOG CONVERTERS: V-F, and F-V converters, performance specifications, D-A conversion techniques (R-2R & binary weighted) multiplying DAC applications.

7 Hours

UNIT – 6

A-D conversion techniques (flash, successive approximation, single slope, dual slope), over sampling converters.

6 Hours

UNIT – 7

Introduction-block diagram of a virtual instrument-physical quantities and analog interfaces-hardware and software-user interface-advantages over conventional instruments-architecture of a virtual instruments and its relation to the operating system.

6 Hours

UNIT – 8

Overview of software-labview-graphical user interface-controls and indicators-labels and texts-data types-format-data flow programming-editing-debugging and running a virtual instrument-graphical programming palettes and tools-front panel objects-functions and libraries. **7 Hours**

TEXT BOOKS:

1. **Process Control Instrumentation Technology**-C D Johnson.
2. **Design with operational amplifiers and analog integrated circuits**-3rd Edition, SERGIO FRANCO, Tata McGraw Hill
3. **Virtual instrumentation, LABVIEW,** Sanjay Guptha, TMH New Delhi 2003

REFERENCE BOOKS:

1. **Instrument Engineers Handbook-(Vol 1 & 2)-**B G Liptak,Chilton Book Company
2. **Chemical process control an introduction to theory and practice-**Stephanopoulos
3. **A Users Handbook of D/A and A/D converters-**.E.R.HNATEK, Wiley publications
4. **Computer Aided Process Control-** S K Singh, Prentice Hall of India.
5. **Process control: Concepts, dynamics &Application-S.K. Singh, PHI.**

ANALYTICAL AND PHARMACEUTICAL INSTRUMENTATION

Subject Code	:	**10IT65**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

Unit – 1

Visible ultraviolet spectrophotometers: Electromagnetic radiation, Beer Lambert law, absorption instruments, colorimeters, spectrophotometers, infrared spectroscopy theory, instrument and its types.

6 Hours

Unit - 2

Flame photometers: Principle of flame photometers constructional details of flame photometers, accessories of flame photometers, interference in flame photometry and determinations.

7 Hours

Unit - 3

Fluorimeters & phosphorimeters: Principle of fluotrscence, measurement of fluotrscence, spectro fluotrscence, microprocessor based spectro fluotrscence, Measurement of Phosphorescence.

6 Hours

Unit - 4

Mass spectrometer & NMR spectrometer: Basic concept, types of mass spectrometer, components of mass spectrometer, resolution and applications. Principle of NMR, constructional details, sensitivity enhancement for analytical NMR spectroscopy. Use of computers with NMR spectrometers.

7 Hours

PART B

Unit - 5

Automated bio-chemical analysis systems: Basic concept, system details, system components, typical multiple analysis system, flow injection analysis

6 Hours

Unit - 6

Chromatography: Gas chromatograph- basic concepts, parts of gas chromatograph. Method of peak areas, liquid chromatography- basic concepts, types if liquid chromatography, the liquid chromatograph.

7 Hours

Unit – 7

Electrophoresis and densitometers: Basic Electrophoresis, Electrophoresis techniques, paper Electrophoresis, Electrophoresis apparatus, spectrodensitometer, microprocessor based densitometer, microelectrophoresis.

7 Hours

Unit - 8

Blood gas analyzer: Principle of pH measurement, electrode of pH measurement, Blood pH measurement, measurement of Blood pCO_2, measurement of Blood pO_2, complete Blood gas analyzer, commercially available Blood gas analyzers.

6 Hours

Text Book

1. Hand book of analytical Instruments by R. S. Khandpur, TMH Publications 1st Ed 1989, New Delhi

Reference Book

1. Instrumental methods of analysis by H. H. Willard, L. L. Merritt & J. A. Dean, CBS Publications 7th Ed 1988
2. Principles of Instrumental analysis by S. J. Holler & T. A. Nilman Saunders college Publications 5st Ed 1998

ELECTIVE-I (GROUP A)

COMPUTER NETWORKS

Subject Code	:	**10IT661**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Uses of Computer Networks, Network Hardware, Network Software, Reference Models, Example Networks, Network Standardization

6 Hours

UNIT - 2

THE PHYSICAL LAYER: The Theoretical Basis for Data Communication, Guided Transmission Media, Wireless Transmission, Communication Satellites, The Public Switched Telephone Network, The Mobile Telephone System, Cable Television.

7 Hours

UNIT - 3

THE DATA LINK LAYER: Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, Protocol Verification, Data Link Protocols.

6 Hours

UNIT - 4

THE MEDIUM ACCESS CONTROL SUB LAYER: The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANS, Broadband Wireless, Bluetooth, Data Link Layer Switching.

7 Hours

PART - B

UNIT - 5

THE NETWORK LAYER: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, and Quality of Service.

6 Hours

UNIT - 6

INTERNET WORKING, THE NETWORK LAYER IN THE INTERNET, THE TRANSPORT LAYER: The Transport Service.

7 Hours

UNIT - 7

A Simple Transport Protocol, the Internet Transport Protocols (TCP and UDP), Performance Issues.

7 Hours

UNIT - 8

THE APPLICATION LAYER: Domain Name System (DNS), electronic mail, worldwide web, multimedia.

6 Hours

TEXT BOOK:

1. **Computer Networks :** Andrews S. Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:

1. **ATM Protocol concepts-** HONDEL AND FLUBER, Addison Wesley.
2. **Data and computer networks-** W STALLINGS 5th Edition, Prentice Hall of India 1998.

Subject Code	:	**10IT662**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO MICROCONTROLLERS: Architecture, RISC and CISC processors. Harvard and Von Neumann architecture. PIC16F877 Architecture.

6 Hours

UNIT - 2

PIC16F877Instructions Set, addressing modes, Assembly language Programs.

7 Hours

UNIT - 3

Memory organization, ports, Interrupts.

6 Hours

UNIT - 4

PIC16F877 PERIPHERALS: Timers, CCP modules, ADC modules, configuration word and programming.

7 Hours

PART - B

UNIT - 5

SERIAL COMMUNICATION MODULES: UART, I^2C, PSP, EEPROM, Reset, Oscillator modes, configuration word and programming

7 Hours

UNIT - 6

INTERFACING: Interfacing of keys, Display - LEDs, 7-segment LED (multiplexed display) & LCDs, **(**Programs in assembly and C**).**

6 Hours

UNIT - 7

DAC and ADC, generation of PWM with PIC microcontroller. **(**Programs in assembly and C)

6 Hours

UNIT - 8

APPLICATIONS OF MICROCONTROLLERS. EX : RPM meter, event counter, temperature controller**.** (Programs in assembly and C)**.** Development Tools**:** Simulators, debuggers, cross compilers, in-circuit Emulators for the microcontrollers.

7 Hours

TEXT BOOKS:

1. **Design with PIC microcontrollers**- J.B.PEATMAN, PH Engg, 1998.
2. **Fundamentals of Microcontrollers and Applications in Embedded systems, Ramesh Gaonkar, Penram International Publishing Pvt. Ltd. 2007**.

REFERENCE BOOKS:

1. **PICs in practice-**F P VOLPE & S VOLPE, Elector Electronics.
2. **Embedded control handbook**- MICROCHIP (Vol 1& 2).
3. **PIC micro mid-range MCU family reference manual-** MICROCHIP
4. **Microcontrollers; Architecture implementation and programming**- HINTZ, McGraw-Hill

APPLIED NUMERICAL METHODS

Subject Code	:	**10IT663**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

Part - A

UNIT - 1

NUMERICAL COMPUTATION: Motivation and objectives / Number Representation/ Machine Precision/ / Round off Error /Truncation Error / Random Number Generation.

6 Hours

UNITS - 2 & 3

LINEAR ALGEBRAIC SYSTEMS: Motivation and objectives / Gauss-Jordan Elimination/ Gaussian Elimination/LU Decomposition/ III-Conditioned systems/ Iterative Methods.

13 Hours

UNIT - 4

EIGENVALUES AND EIGENVECTORS: Motivation and objectives/ The Characteristic polynomial/ Power methods/ Jacobs's method/ householder transformation/ QR method/ Danilevskys Method/ Polynomial Roots.

7 Hours

PART - B

UNIT - 5

CURVE FITTING: Motivation and objectives/ Interpolation/ Newtons Difference Formula/ Cubic Splines/ Least square/ Two- Dimensional Interpolation.

7 Hours

UNIT - 6 & 7

ROOT FINDING: Motivation and objectives/ Bracketing methods/ contraction mapping method/ secant Method/ Mullers Method/ Newton's Method/ polynomial roots/ Nonlinear systems of equations.

12 Hours

UNIT - 8

OPTIMIZATION: motivation and objectives/ Local and Global minima/ Line searches/ steepest Descent method/ Conjugate- Gradient Method/ quasi-Newton Methods/ Penalty Functions / Simulated Annealing

7 Hours

TEXT BOOK:

1. **Applied Numerical Methods for Engineers using MATLAB and C**-ROBERT J.SCHILING & SANDRA HARRIS, Thomson Publishing, Singapore / Bangalore, 2002.

REFERENCE BOOKS:

1. **Applied Numerical Analysis-** GERALD AND WHETELY, Pearson Education, New Delhi, 2002.
2. **Numerical Receipies in C-** WILLIM PRESS ET.AL, Cambridge publishers, New Delhi.
3. **Numerical Methods for Scientists & Engineers-** Sankara Rao, 3rd edition, PHI.

OPERATING SYSTEMS

Subject Code	:	**10IT664**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO OPERATING SYSTEMS AND CLASSIFICATION: What is an operating system, Mainframe systems, Desktop systems, multiprocessor system, Distributed system, Clustered system, Real time system, Handled system, Feature migration, computing environments. Operating system structures: System components, OS Services, System calls, System programs, System structure, Virtual machines.

7 Hours

UNIT - 2

PROCESS, INTER PROCESS COMMUNICATION, THREADS & CPU SCHEDULING: Process concept, Process scheduling, Operation on processes, Co-operating processes, Inter process communication. Threads – overview, Multithreading models, Threading issues, P threads, Java threads. CPU scheduling – Basic concepts, Scheduling criteria, Scheduling algorithms, multiple processors scheduling, real time scheduling.

7 Hours

UNIT - 3

PROCESS SYNCHRONIZATION AND HANDLING DEADLOCKS: The critical section problem, Synchronization hardware, Semaphores, Classical problems of synchronization, critical regions, monitors.

6 Hours

UNIT - 4

DEADLOCK – System model, Deadlock characterization, Methods for handling deadlocks – deadlock prevention, deadlock avoidance, deadlock detection and recovery from deadlock.

6 Hours

PART - B

UNIT - 5

STORAGE MANAGEMENT: Main memory management – Background, Swapping, Contiguous, allocation, Paging, Segmentation, Segmentation with paging Virtual memory – Background, Demand paging, Process creation, Page replacement algorithms, Allocation of frames, Thrashing

7 Hours

UNIT - 6

FILE SYSTEM INTERFACE – File concept, Access methods, Directory structure, File system mounting, File system implementation, Directory implementation, Allocation methods, free space management. Mass storage structures – Disk structure, Disk scheduling methods, Disk management, Swap space management.

7 Hours

UNITS - 7 & 8

PROTECTION AND SECURITY: Goals of protection, domain of protection, access matrix, implementation of access matrix, Revocation of access rights, The security problem, Authentication, Program threats, System threats, Security systems and facilities, Intrusion detection, introduction to cryptography, basics of Linux operating system.

12 Hours

TEXT BOOK:

1. **Operating System Concepts**-by Abraham silberschatz, Peter Baer Galvin, Greg Gagne, 6th edition, John wiley & sons 2003.

REFERENCE BOOKS:

1. **Operating system concepts and design**- Milan Milankovic 2nd Edition, McGraw Hill 1992.
2. **Operating systems**- Harvey M Deital Addison Wesley 1990
3. **Operating Systems concepts based approach**, D.M Dhamdhere, Tata Mc Graw Hill 2002.

CONTROL SYSTEM & DATA CONVERTERS LAB

Subject Code	:	**10ITL67**	*IA Marks*	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

1. Sample and Hold circuits using discrete components and IC.
2. Analog multiplexer & programmable gain amplifier using analog mux.
3. 4 Bit Binary weighted & R-2R DAC (using Discrete components)
4. 3 bit flash ADC.
5. 8 Bit DAC using IC (DAC 0800)
6. 8 Bit ADC using IC (Successive approximation method)
7. To determine the step response of 1st order system using RC circuit and to measure 'τ' for different values of R & C.
8. To determine the step response of 2nd order system using RLC circuit and to determine rise time, peak time, overshoot, settling time for over damped, under damped and critically damped conditions. Verification using theoretically calculated values.
9. To determine the response of lead, lag & lead-lag circuits.
10. To design relay driving circuits using photo devices (LDR & Optocouplers).
11. To determine the response of P, PI and PID controller for step input.
12. Using MATLAB/LAB VIEW software, plot the Bode-plot, Nyquist diagram & Root locus with and without compensation for a given transfer function & specifications. Verification using theoretical values.

INSTRUMENTATION LAB

Subject Code	:	**10ITL68**	*IA Marks*	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

1. Characteristics of potentiometric transducer.
2. Characteristics of LVDT.
3. Characteristics of capacitive transducer: variable area type, variable distance type
4. Characteristics of thermistor, RTD, AD590, thermocouple.
5. Characteristics of LDR, Photo Diode & phototransistor: Variable illumination, variable distance.
6. Wheatstone bridge -measurement of bridge sensitivity.
7. Measurement of low resistance using Kelvin double bridge.
8. Measurement of self- inductance using Maxwell bridge and Anderson's bridge.
9. Measurement of unknown capacitance using Desauty's bridge and Schering's bridge.
10. Calibration of voltmeter and ammeter using DC potentiometer.
11. Characteristics of pressure transducer
12. Characteristics of load cell & cantilever using strain gauge (quarter, half and full bridge)

VII SEMESTER
VLSI DESIGN

Subject Code	:	**10IT71**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO MOS TECHNOLOGY: Moores law, speed –power performance, nMOS fabrication, CMOS fabrication: nwell, pwell processes, BiCMOS, comparison of bipolar & CMOS.

6 Hours

UNIT - 2

BASIC ELECTRICAL PROPERTIES OF MOS & BICMOS CIRCUITS: Drain to source current versus voltage characteristics, threshold voltage, transconductance, nMOS inverter, Determination of pull up to pull down ratio, nMOS inverter driven through one or more pass transistors, alternative forms of pull-up, CMOS inverter, MOS transistor circuit model, BiCMOS inverters, latch up.

7 Hours

UNIT - 3

BASIC CIRCUIT CONCEPTS: Sheet resistance, area capacitance calculation. Delay unit, inverter delay, estimation of CMOS inverter delay, driving of large capacitance loads, super buffers, BiCMOS drivers, propagation delays & wiring capacitances.

7 Hours

UNIT - 4

MOS AND BICMOS CIRCUIT DESIGN PROCESSES: MOS layers, stick diagrams, nMOS design style; CMOS design style, Design rules and layout, λ based design. Scaling of MOS circuits: Scaling factors for device parameters, limitations of scaling**.**

6 Hours

PART - B

UNIT - 5

SUBSYSTEM DESIGN & LAYOUT: Switch logic pass transistor, gate logic inverter, Nand gates, Nor gates, pseudo nMOS, dynamic CMOS example of structured design, parity generator, Bus arbitration, Multiplexers, logic function block, code converter.

6 Hours

UNIT - 6

Clocked sequential circuits, dynamic shift registers, bus lines. Subsystem design processes General considerations, 4 bit arithmetic processor, 4-bit shifter.

6 Hours

UNIT - 7

DESIGN PROCESS- COMPUTATIONAL ELEMENTS: Regularity, design of ALU subsystem, ALU using adders, Carry look ahead adders, Multipliers, serial parallel multipliers, Braun array, Bough-wooley multiplier. Pipelined multiplier array, modified Booth's algorithm, Wallace tree multiplier.

7 Hours

UNIT - 8

MEMORY, REGISTER & ASPECTS OF TIMING: 3 TRANSISTOR DYNAMIC RAM CELL, DYNAMIC MEMORY CELL, PSEUDO-static RAM, JK FF, D FF circuits, RAM arrays. Practical aspects and testability: Some thoughts of performance, optimization, and CAD tools for design & Simulation.

7 Hours

TEXT BOOK:

1. **Basic VLSI design**-3rd Edition Douglas A Pucknell, Kamaran Eshraghian, Prentice Hall of India publication, 2005.

REFERENCE BOOKS:

1. **CMOS Digital Integrated Circuits, Analysis and design**, 3rd Edition, Sung-Mo (steve) Kang, Yusuf Leblbici, Tata Mcgraw Hill.
2. **VLSI Technology,** 2nd Edition, S.M .Sze, Tata Mcgraw Hill.

DSP ARCHITECTURE

Subject Code	:	**10IT72**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO DIGITAL SIGNAL PROCESSING: Introduction, A digital signal processing system, the sampling process, discrete time sequences, Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time invariant systems, Digital filters, Decimation and Interpolation, Analysis and Design tool for DSP systems.

7 Hours

UNIT – 2

COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATION: Introduction, Number formats for signals and coefficients in DSP systems, Dynamic range and precision, Sources of error in DSP implementations, A/D conversion error, DSP computational error and D/A Conversion error.

7Hours

UNIT - 3

Digital Signal Processing Devices: Introduction, Basic architectural features, DSP computational building blocks, Bus architecture and memory, Data addressing capabilities, Address generation unit, Programmability and Program execution, Speed issues.

6 Hours

UNIT - 4

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: Introduction, Architecture of TMS320C54xx digital signal processors: Bus structure, Central processing unit, internal memory and memory mapped registers, Data

addressing modes of TMS320C54xx processors, Memory space of TMS320C54xx processors.

6 Hours

PART – B

UNIT - 5

TMS320C54xx Instructions and programming, On-chip peripherals, Interrupts of TMS320C54xx processors, Pipeline operation of TMS320C54xx processors.

7 Hours

UNIT - 6

IMPLEMENTATION OF BASIC DSP ALGORITHMS: Introduction, The Q-notation, Linear Convolution, Circular Convolution, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, Adaptive Filters, butterfly computation and FFT implementation on the TMS320C54xx

7 Hours

UNIT - 7

INTERFACING MEMORY AND PARALLEL I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES: Introduction, Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). Interfacing Serial Converters to a Programmable DSP device: Introduction, Synchronous Serial Interface (SSI), A multi channel buffered serial port (McBSP).

6 Hours

UNIT - 8

A CODEC INTERFACE CIRCUIT: CODEC-DSP interface circuit. Applications of programmable DSP devices**:** Introduction, A DSP system, DSP-based Biotelemetry receiver, A speech processing system, An image processing system.

6 Hours

TEXT BOOK:

1. **Digital Signal Processing**-Avtar Singh and S. Srinivasan, Thomson Publishing, 2004, Singapore.
2. **Real Time Digital Signal Processing: Fundamentals, Algorithms and implementation using TMS Processor**-V.Udayashankara, Prentice Hall of India, New Delhi, 2010

REFERENCE BOOKS:

1. **Digital Signal Processing-** A Practical Approach, Emmanuel C Ifeachor and B W Jervis, Pearson Education, New Delhi.
2. **Digital Signal Processors**- B Venkataramani and M Bhaskar, Tata-McGraw Hill, New Delhi, 2002.

ROBOTICS AND CONTROL

Subject Code	:	**10IT73**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

ROBOT ARM KINEMATICS: Introduction, The direct Kinematics Problem, Rotation Matrices, Composite Rotation Matrix, Rotation matrix about an arbitrary axis, Rotation matrix with Euler angle representation, Geometric interpretation of Homogeneous transformation matrices, composite homogeneous transformation matrix, Links joints and their parameters. The Denavit Hartenberg representation.

7 Hours

UNIT - 2

Kinematic equations for manipulators, Other specifications of the locations of the End-Effector, Classification of Manipulators, The inverse Kinematics problem, Inverse Transform Technique for Euler Angles Solution

7 Hours

UNIT - 3

Planning of Manipulator Trajectories: Introduction, General considerations on Trajectory planning, joint-interpolated Trajectories, calculation of a 4-3-4 Joint trajectory, Cubic Spline Trajectory. Sensing: Range sensing, Triangulation, Structured Lighting Approach, Time-of-Flight range finders.

6 Hours

UNIT - 4

Proximity sensing, Inductive sensors, Hall effect sensors, Capacitive Sensors, Ultrasonic sensors, Optical Proximity Sensors, Touch sensors, Binary sensors, Analog sensors, Force and Torque sensing, Elements of a Wrist sensor.

6 Hours

PART - B

UNIT - 5

LOW-LEVEL VISION: Image acquisition, illumination Techniques, imaging geometry, some basic transformations, perspective transformations.

7 Hours

UNIT - 6

Camera model, camera calibration, stereo imaging, some basic relationships between pixels, Neighbours of a Pixel, connectivity, distance measures, Preprocessing, Spatial-Domain methods, Frequency-Domain methods, Smoothing, Enhancement, Edge detection, Thresholding.

7 Hours

UNIT - 7

Higher-Level Vision: Segmentation, Edge Linking and Boundary detection, Thresholding. **6 Hours**

UNIT - 8

Region-oriented segmentation, the use of motion, description, Boundary descriptors, Regional descriptors.

6 Hours

TEXT BOOK:

1. **Robotics control sensing Vision and Intelligence**- K.S.Fu, R.C.Gonzalez, C.S.G. Lee, McGraw Hill, 1987.

2. **Robot Technology Fundamentals -** James G.Keramas, Cengage learning

REFERENCE BOOK:

1. **Introduction to Robotics Mechanics and control**– John J. Craig, 2nd Edition, Pearson education, 2003.

AUTOMATION IN PROCESS CONTROL

Subject Code	:	**10IT74**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLERS, INTRODUCTION TO PLC OPERATION: The digital concept, Analog Signals, The input status file, the output status file, Input and output status files, sixteen point I/O modules, PLC memory.

7 Hours

UNIT - 2

INTRODUCTION TO LOGIC: What is logic, Conventional Ladder v/s LPLC ladder, series and parallel function of OR, AND, NOT logic, XOR logic, Analysis of rung. Input modules: Discrete input modules, Discrete AC and DC input modules. Output Modules: Discrete output modules, solid-state output module switching, relay output modules.

7 Hours

UNITS - 3 & 4

PLC INSTRUCTIONS: The basic relay instructions, Normally open and normally closed instructions, output latching instructions, Understanding Relay instructions and the programmable controller input modules-interfacing start stop pushbutton and motor to PLC, developing ladder diagram with analytical problems.

12 Hours

PART - B

UNIT - 5

TIMER AND COUNTER INSTRUCTIONS: On delay and off delay and retentive timer instructions, PLC counter up and down instructions, combining counters and timers.

6 Hours

UNIT - 6

COMPARISON AND DATA HANDLING INSTRUCTIONS: Data handling instructions, Sequencer instructions: Programming sequence output instructions, developing ladder diagram with analytical.

6 Hours

UNIT - 7

INTRODUCTION TO SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) AS APPLIED TO PROCESS CONTROL SYSTEMS. DISTRIBUTED CONTROL SYSTEM (DCS): Evolution of digital controllers, advantages of digital control, process control requirements of digital control, computer network, interconnection of networks, communication in DCS.

7 Hours

UNIT - 8

DIFFERENT BUS CONFIGURATIONS USED FOR INDUSTRIAL AUTOMATION -RS232, UART, RS485, GPIB, CAN, USB, I2C, TCP/IP, HART and OLE protocol, Industrial field bus- FIP (Factory Instrumentation protocol), PROFIBUS (Processfieldbus), Bitbus.

7 Hours

TEXT BOOKS:

1. **Introduction to Programmable Logic Controllers-** Garry Dunning, 2nd Edition, Thomson, ISBN: 981-240-625-5.
2. **Computer control of processes** - M.Chidambaram, Narosa publishing,
3. **Computer Based Industrial control**- Krishna Kant, Prentice Hall of India.

REFERENCE BOOKS:

1. **Process Control Instrumentation Technology -** Curtis Johnson, Prentice Hall of India.
2. **Instrumentation Engineers Hand Book** – Process Control, Bela G Liptak, Chilton Book Company, Pennsylvania.
3. **Industrial Control and Instrumentation**, W.Bolton, Universities Press.
4. **Industrial Electronic Control: Including PLC- Paul.B. 2nd edition-** Prentice Hall India.

ELECTIVE-II (GROUP B)
ARM PROCESSORS

Subject Code	:	**10IT751**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART – A

Unit 1 and 2

Introduction to embedded systems, ARM embedded system, ARM processor fundamentals: Registers, Current program status register, pipeline, exceptions, Interrupts, the Vector table, Core extensions, ARM processor families 14 Hours

Unit 3

Introduction to ARM instruction set: Data processing instructions, Branch instructions, load-store instructions, software interrupt instructions, program status register instructions, Coprocessor instructions. 6 Hours

Unit4

Introduction to thumb instruction set: Thumb programmers model, Thumb branch instructions, data processing instructions, Single register load-store Instructions, Multiple-Register load-store instruction, Stack instruction, Software interrupt instruction. 6 Hours

Part B

Unit 5

ARM assembly language Programming 7 Hours

Unit 6

Architectural Support for High-Level languages: Data types, Floating-point data types, The ARM floating point architecture, Expressions, Conditional statements, Loops, functions and procedures.

6 Hours

Unit 7

Introduction to DSP on the ARM, FIR filters, IIR filters, DFT 7 Hours

Unit8

Embedded operating systems 6 Hours

TEXT BOOKS:

1. **ARM system developers guide**, Andrew N Sloss, Dominic Symes and Chris wright, Elsevier, Morgan Kaufman publishers, 2008.
2. **Arm-System-On-Chip- Architecture**: By Steve Furber-Pearson.

REFERENCE BOOKS:

1. **"Embedded system design"**, Frank vahid/Tony givargis, John wiley &sons, 2003.
2. **"Embedded/Real time systems, Real-Time systems"**, Dr.K.V.K.K Prasad, Dreamtech press, 2004.

AIRCRAFT INSTRUMENTATION

Subject Code	:	**10IT752**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

AIRCRAFT INSTRUMENTS: Introduction-Qualitative and quantitative displays, basic T grouping of instruments, basics of Attitude Director Indicator (ADI) & Horizontal Situation Indicator, flight deck of modern aircraft (glass cockpit).

6 Hours

UNIT - 2

AIR DATA INSTRUMENTS: pneumatic type and air data computers, International Standard Atmosphere (ISA), basic pneumatic air data system, combined pitot-static probe, separate static probe, air speed indicator, altimeters, instantaneous vertical speed indicator.

7 Hours

UNIT - 3

AIR DATA WARNING SYSTEM: Mach warning system, altitude alerts system, airspeed warning system.

6 Hours

UNIT - 4

Directional Systems: Earth's total magnetic field, horizontal and vertical components of total field direct reading compass and its limitations, fluxgate detector units. gyro stabilized direction indicating systems.

7 Hours

PART - B

UNIT - 5

GYROSCOPIC FLIGHT INSTRUMENTS: types of gyros-mechanical, ring laser gyros, fiber optic gyros and their limitations, basic mechanical gyro and its properties namely rigidity and precision, gyro horizon, direction indicator, turn and bank indicator.

7 Hours

UNITS - 6 & 7

ENGINE INSTRUMENTS: pressure measurement (EPR), Temperature measurement (EGT), capacitance type volumetric fuel quantity indicator, densitometer, fuel quantity indicator by weight. Engine speed measurement, torque measurement, integrated impellor type flow meter.

12 Hours

UNIT - 8

AIRCRAFT SAFETY AND WARNING SYSTEMS: basic principles and block schematic descriptions of stall warning system, ground proximity warning systems, traffic collision avoidance system.

7 Hours

TEXT BOOK:

1. **Aircraft Instruments and Integrated Systems**- EHJ Pallet, Longman Scientific & Technical, 1992.

REFERENCE BOOKS:

1. **Aircraft Instruments**- C A Williams Galgotia Publications, New Delhi.
2. **Aircraft Propulsion-** Bhaskar Roy, Elsevier publications, New Delhi.

SYSTEM MODELLING

Subject Code	:	**10IT753**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

Part-A

Unit 1:

Fundamental concepts in mathematical modeling: systems, modeling, and analysis. Abstraction. Physical dimensions and units. Linearity and superposition. A gentle introduction to differential equations. Scaling in elementary differential equations. Balance and conservation laws and the system boundary approach: balance equations, conservation laws, examples.

6Hrs

Unit 2:

Lumped–element modeling: introduction, One dimensional translational mechanical systems; the element comprising simple mechanical systems. Translational springs. Translational dampers. Mass elements in translational motion. The ideal force and the ideal displacement inputs. The interrelationship between forces in different elements in a system; Newton's second law. The interrelationship between deformations of different elements in a system: consistency of displacements. Simplifying models through combination of elements. Examples. RLC electrical systems: the interrelationship between the voltage differences across elements in a system. Simplifying models through combination of elements. Examples.

7 Hrs

Unit 3:

Generalizing lumped-element modeling: introduction. A framework for unifying lumped-element models; some common approaches. Basic linear graph theory. Relating linear graph theory to lumped-element models of physical systems. Manipulation of graph theory rules. Examples. Rotational mechanical systems; the basics of rotational mechanics. Rotational mechanical system elements. Torsional springs. Torsional damper elements. The mass moment of inertia element. The ideal torque and ideal angular displacement inputs. The rules governing rotational mechanical systems. Examples. 7 Hrs.

Unit 4:

Thermal and hydraulic systems: basic physics of incompressible fluids. Hydraulic system elements. The pipe element. The tank element. Ideal flow rate and ideal pressure sources. The rules governing the hydraulic model. Basic concept in heat transfer. Thermal system elements. The thermal resistance element. The thermal mass element. Ideal heat transfer rate and ideal temperature inputs. The rules governing the thermal model. Examples. 6 Hrs.

Part-B

Unit 5:

First order system models: governing equations for first order systems. Canonical form of first order systems. Classifications of responses and systems. Solution of governing equations; free response and forced response. Transient response specifications. Experimental determination of time constant: free response and forced response. Application of superposition in first order system models.

7 Hrs.

Unit 6:

Second- order models of systems: governing equations for second order systems. Canonical form of second-order systems. Classifications of responses and systems. Solution of governing equations; free response and forced response. Transient response specifications. Experimental determination of ζ: using free response and step response.

6 Hrs.

Unit 7:

State space formulations of systems problems: examples of state variables and state equations. Matrix formulation. Free response and Eigen value

problem. Stability. Graphical solution. Forced response and response to step input. Examples. Phase plane and stability considerations. **6 Hrs.**

Unit 8:

Relating the time domain, frequency domain, and state space: introduction. The pole-zero plot; relating pole zero plot to transfer function, the governing equation, and state matrix Eigen values. Relating plot location to system parameters. Relating frequency to pole location; the relationship between the T(s) surface and the frequency response function. Higher order systems and dominant poles. Transient response, poles, and frequency response; the relationship between the mathematical form of the free response, pole location, and system parameters. The effect of Non dominant poles on transient behavior. State space trajectories, poles, and transient response. Examples. **7 Hrs.**

Text book:

1. "Fundamentals of modeling and analyzing engineering systems" Philip D. Cha, James J. Rosenberg and Clive L. Dym, First Edition,2000. Cambridge University Press.

Reference Books:

1. Chemical Process Control an Introduction to theory and practice, George Stephanopoulos,
   PHI,1998, Sixth reprint.
2. Modern Control Engineering, Roy Choudhury, Printice Hall India, 2004-reprint.
3. Digital Control and State variable methods, Madan Gopal, Second Edition, , Printice Hall India, 2004-reprint.

MEDICAL IMAGING SYSTEMS

Subject Code	:	**10IT754**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

X-RAYS: Interaction between X-Rays and matter, Intensity of an X-Ray, Attenuation, X-Ray Generation and Generators, Beam Restrictors and Grids, Intensifying screens, fluorescent screens and Image intensifiers.

6 Hours

UNIT - 2

X-Ray detectors, Conventional X-Ray radiography, Fluoroscopy, Angiography, Digital radiography, Dynamic spatial reconstructor, X-Ray image characteristics, Biological effects of ionizing radiation.

6 Hours

UNIT - 3

COMPUTED TOMOGRAPHY: Conventional tomography, Computed tomography principle, Projection function Generations of CT machines, Electron beam CT, Reconstruction algorithms, Helical CT. **7 Hours**

UNIT - 4

ULTRASOUND IMAGING: Acoustic propagation, Attenuation, Absorption and Scattering, Ultrasonic transducers, Arrays, A mode, B mode, M mode scanners, Tissue characterization, Color Doppler flow imaging.

7 Hours

PART - B

UNIT - 5

MAGNETIC RESONANCE IMAGING: Angular momentum, Magnetic dipole moment, Magnetization, Larmor frequency, Rotating frame of reference, Free induction decay, Relaxation times, Pulse sequences. Introduction to functional MRI. **7 Hours**

UNIT - 6

BLOCK OF A MAGNETIC RESONANCE IMAGER: Slice selection, Frequency encoding, Phase encoding, Spin-Echo imaging, Gradient-Echo imaging, Imaging safety. **6 Hours**

UNIT - 7

RADIONUCLIDE IMAGING: Interaction of nuclear particles and matter, Nuclear sources, Radionuclide generators, Nuclear radiation detectors, Rectilinear scanner, scintillation camera, SPECT, PET. **6 Hours**

UNIT - 8

THERMAL IMAGING: Medical thermography, Infrared detectors, Thermographic equipment, Pyroelectric vidicon camera. **7 Hours**

TEXT BOOKS:

1. **Principles of Medical Imaging**- Kirk shung, Academic Press.
2. **Handbook of Biomedical Instrumentation**- Khandpur, Tata McGraw-Hill Publishing Company Ltd., 2nd Edition, 2003.

REFERENCE BOOKS:

1. **Medical Imaging Signals and Systems**- Jerry L Prince and Jonathan M Links, Prentice Hall of India/Pearson Education.
2. **Fundamentals of medical Imaging**- Zhong Hicho and Manbir singh, John Wiley.

ELECTIVE-III (GROUP C)
EMBEDDED SYSTEM & RTOS

Subject Code	:	**10IT761**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: An Embedded System; Characteristics of Embedded Systems; Software embedded into a system; Real Time Definitions, Events and Determinism, Synchronous & Asynchronous Events, Determinism.

6 Hours

UNIT - 2

EMBEDDED MICROCONTROLLER CORE AND ARCHITECTURE: 8051 micro controller; Architecture; Instruction sets; Assembly language programming.

6 Hours

UNIT - 3

I/O PORT PROGRAMMING: Timer / counter programming, Serial Communication; Interrupts, programming.

7 Hours

UNIT - 4

REAL TIME SPECIFICATIONS AND DESIGN TECHNIQUE: Mathematical specifications, flow charts, structure charts, Finite state automata, data flow diagrams, Petri Nets, Warnier Orr Notation, State charts.

7 Hours

PART - B

UNIT - 5

PROCESSOR AND MEMORY ORGANIZATION: Structural Units in a Processor; Memory Devices, Memory selection for an embedded system; Direct Memory Access, DMA controllers; Interfacing Processor, Memory and I/O Devices.

6 Hours

UNIT - 6

INTERRUPT SERVICING (HANDLING) MECHANISM: Context and the periods for context switching; Deadline and interrupt latency. Language Features: Parameter passing, Recursion, Dynamic allocation, Typing, exception handling, abstract data typing.

6 Hours

UNIT - 7

REAL TIME KERNELS: Real Time and Embedded Operating Systems; Interrupt Routines in RTOS environment; co routines, Interrupt driven systems, Foreground/background systems, Full-featured Real Time Operating Systems.

INTER-PROCESS COMMUNICATION AND SYNCHRONIZATION OF PROCESSES: Multiple processes in an application; Problem of sharing data by multiple tasks and routines; Inter Process Communication, Mailboxes, Critical Regions, Semaphores, Deadlock.

7 Hours

UNIT - 8

PROGRAMMING LANGUAGES AND TOOLS: DESIRED LANGUAGE CHARACTERISTICS: Data typing; Control Structures; Packages; Exception Handling; Overloading; Multitasking; Task Scheduling; Timing specification; Programming environments; Runtime support.

7 Hours

TEXT BOOKS:

1. **Embedded Systems Architecture; Programming and Design**-Rajkamal; Tata McGraw Hill Publications.
2. **Real–Time Systems Design and Analysis–-**3rd Edition, Phillip A. Laplante. Apr 2004. Wiley-IEEE Press.

REFERENCE BOOKS:

1. **Real Time Systems**- C.M. Krishna, Kang G.Shin McGraw-Hill, 1997.
2. **An Embedded software primer**-David E Simon; Addison Wesley; 2000.
3. **An Introduction to Real Time Systems**-Raymond J.A. Buhr; Donald L. Bailey; Prentice Hall International; 1999.
4. **Embedded Real Time system**-Concepts, Design and Programming, Dr. K. V. K. K. Prasad Dream Tech Pres, New Delhi 2003.

DISTRIBUTED SENSOR NETWORKS

Subject Code	:	**10IT762**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Challenges, Sensor Network Architectures, Sensor Node Deployment, Energy-Efficient Information Processing, Data Dissemination, Self-Configuration Methods.

6 Hours

UNIT - 2

SENSOR NODE DEPLOYMENT: Sensor Node Detection Models, Virtual Force Algorithm, Virtual Forces, Overlapped Sensor Detection Areas, Energy Constraint on the VFA Algorithm, Procedural Description. VFA Simulation Results, Case Studies. Uncertainty Modeling, Modeling of Non-Deterministic Placement, Uncertainty-Aware Placement Algorithms, Procedural Description, Simulation Results, Case Study.

6 Hours

UNIT - 3

ENERGY-AWARE TARGET LOCALIZATION: Detection, Probability Table, Score-Based Ranking Selection of Sensors to Query, 3Energy Evaluation Model, Primitive Energy Evaluation Model, Refined Energy Evaluation Model, Procedural Description, Simulation Results, Case Study.

7 Hours

UNIT - 4

ENERGY-EFFICIENT SELF-ORGANIZATION: Introduction, Relevant Prior Outline of SCARE Basic Scheme, Network Partitioning Problem, Details of SCARE. Time Relationships Ensuring Network, Connectivity Message, Complexity, Optimal Centralized Algorithm, average Comparisons, Performance Evaluation, Simulation Methodology, Simulation Results, Effect of Location, Estimation Error, Conclusion.

7 Hours

PART - B

UNIT - 5

ENERGY-AWARE INFORMATION DISSEMINATION: Introduction, Related Prior Work Location-Aided Flooding, Modified Flooding, Location Information, Virtual Grids, Packet Header Format, LAF Node Types. Information Dissemination using LAF, Resource Management in LAF, Completeness of the Data Dissemination Procedure, Analysis Errors in Location Estimates, Performance Evaluation Energy Model, Simulation Model, Conclusion.

7 Hours

UNIT - 6

OPTIMAL ENERGY EQUIVALENCE ROUTING IN WIRELESS SENSOR NETWORKS : Related Work, Networking Characteristics of WSN, WSN Protocol, Stack Classification of Energy Equivalence Routing, Energy Saving Routing Protocols, Comparison to Flooding, Family Comparison to Sensor-Centric Paradigm

6 Hours

UNIT - 7

DATA-CENTRIC ROUTING AND DIRECTED DIFFUSION: Energy Equivalence Approach, Basics, Neighbor Switching Path, Rerouting EER Algorithms, and Assumptions. Procedures and Functions Formats of Packets EER, Common Entry Algorithm, Common Neighbor Switching EER Algorithm (CNS), Shortest Rerouting EER Algorithm (EERS), Longest Rerouting EER Algorithm (EERL), Simulation Analysis. Basic Procedure, Lifetime and End Condition, Density of Network, Conclusion.

6 Hours

UNIT - 8

TIME SYNCHRONIZATION IN WIRELESS SENSOR NETWORKS: Introduction, Synchronized Time in a WSN, Traditional Network, Time Synchronization, Energy Awareness, Infrastructure Supported Vs. Ad Hoc, Static Topology vs. Dynamics, Connected vs. Disconnected. Design Principles for WSN Time Synchronization, Computer Clocks, Clock Synchronization in DSN, Synchronization Algorithm. The Idea, Time Transformation Message, Delay Time, Stamp Calculation, Improvement

7 Hours

TEXT BOOKS:

1. **Scalable Infrastructure for Distributed Sensor**-Krishnendu Chakrabarty and S. S. Iyengar, Springer 2005.
2. **Networks, ISBN-10: 1852339519-** Springer -Verlag London Limited 2005.

REFERENCE BOOKS:

1. **Distributed sensor Networks**- a Multi-agent perspective, VICTOR LESSER, CHARLES ORITIZ, TAMBE, Kluwer academic publishing/2003.
2. **Distributed Sensor N/W**- By Sundararaja S. Iyengar, Richard R.Brooks, CRC Press.
3. **Wireless Sensor networks**- Freng Zhao, Leonidas Guibas, Morgan Kaufmann Publishers, New Delhi.

HARDWARE SOFTWARE CO-DESIGN

Subject Code	:	**10IT763**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

Unit-I

Introduction

Motivation hardware & software co-design, system design consideration, research scope & overviews, Hardware Software back ground, Embedded systems, models of design representation, the virtual machine hierarchy, the performance modeling, Hardware Software development. 7Hours

Unit-II

Hardware Software Co-Design Research, An informal view of co-design, Hardware Software tradeoffs, crosses fertilization, typical co-design process, co-design environments, limitation of existing approaches, ADEPT modeling environment. 6Hours

Unit-III

Co-design Concepts, Functions, functional decomposition, virtual machines, Hardware Software partitioning, Hardware Software partitions, Hardware Software alterations, Hardware Software tradeoffs, co-design. 7Hours

Unit-IV

Methodology for Co-Design,Amount of unification, general consideration & basic philosophies, a framework for co-design, an example. 6Hours

PART - B

Unit-V

Unified Representation for Hardware & Software. Benefits of unified representation, modeling concepts, a unified representation. 7Hours

Unit-VI

An Abstract Hardware & Software Model Requirement & applications of the models, models of Hardware Software system, an abstract Hardware Software models, generality of the model. 6Hours

Unit-VII

Performance Evaluation

Application of t he abstract Hardware & Software model, examples of performance evaluation. 7Hours

Unit-VIII

Object Oriented Techniques in Hardware Design

Motivation for object oriented technique, data types, modeling hardware components as classes, designing specialized components, data decomposition, Processor example. 6Hours

Text Book:

1. Sanjaya Kumar, James H. Ayler “The Co-design of Embedded Systems: A Unified Hardware Software Representation”, Kluwer Academic Publisher, 2002 .

REFERENCE BOOKS:

1. Peter Mwrwedel, “Embedded System Design”, by Springer P.O. Box 17, 3300 AA Dordrecht, The Netherlands
2. R. Gupta, “Co-synthesis of Hardware and Software for Embedded Systems”, Kluwer 1995.

3. S. Allworth, “Introduction to Real-time Software Design”,Springer-Verlag, 1984.
4. C. M. Krishna, K. Shin, “Real-time Systems”, Mc-Graw Hill, 1997
5. Peter Marwedel, G. Goosens, “Code Generation for Embedded Processors”, Kluwer Academic Publishers, 1995.

MICRO AND SMART SYSTEMS TECHNOLOGY

Subject Code	:	**10MS769**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO MICRO AND SMART SYSTEMS

a) What are smart-material systems? Evolution of smart materials, structures and systems. Components of a smart system. Application areas. Commercial products.

b) What are microsystems? Feynman’s vision. Micromachined transducers. Evolution of micro-manufacturing. Multi-disciplinary aspects. Applications areas. Commercial products.

6 Hours

UNIT - 2

MICRO AND SMART DEVICES AND SYSTEMS: PRINCIPLES AND MATERIALS

a) Definitions and salient features of sensors, actuators, and systems.

b) **SENSORS**: silicon capacitive accelerometer, piezo-resistive pressure sensor, blood analyzer, conductometric gas sensor, fiber-optic gyroscope and surface-acoustic-wave based wireless strain sensor.

c) **ACTUATORS**: silicon micro-mirror arrays, piezo-electric based inkjet print-head, electrostatic comb-drive and micromotor, magnetic micro relay, shape-memory-alloy based actuator, electro-thermal actuator

d) **SYSTEMS**: micro gas turbine, portable clinical analyzer, active noise control in a helicopter cabin

7 Hours

UNIT - 3

MICROMANUFACTURING AND MATERIAL PROCESSING:

a) Silicon wafer processing, lithography, thin-film deposition, etching (wet and dry), wafer bonding, and metallization.
b) Silicon micromachining: surface, bulk, moulding, bonding based process flows.
c) Thick-film processing:
d) Smart material processing:
e) Processing of other materials: ceramics, polymers and metals
f) Emerging trends

7 Hours

UNIT - 4

MODELLING:

a) Scaling issues.
b) Elastic deformation and stress analysis of beams and plates. Residual stresses and stress gradients. Thermal loading. Heat transfer issues. Basic fluids issues.
c) Electrostatics. Coupled electromechanics. Electromagnetic actuation. Capillary electro-phoresis. Piezoresistive modeling. Piezoelectric modeling. Magnetostrictive actuators.

6 Hours

PART - B

UNIT - 5

COMPUTER-AIDED SIMULATION AND DESIGN: Background to the finite element element method. Coupled-domain simulations using Matlab. Commercial software.

6 Hours

UNIT - 6

ELECTRONICS CIRCUITS AND CONTROL: Carrier concentrations, semiconductor diodes, transistors, MOSFET amplifiers, operational amplifiers. Basic Op-Amp circuits. Charge-measuring circuits. Examples from microsystems. Transfer function, state-space modeling, stability, PID controllers, and model order reduction. Examples from smart systems and micromachined accelerometer or a thermal cycler. **7 Hours**

UNIT - 7

INTEGRATION AND PACKAGING OF MICRO ELECTRO-MECHANICAL SYSTEMS: Integration of microelectronics and micro devices at wafer and chip levels. Microelectronic packaging: wire and ball bonding, flip-chip. Low-temperature-cofired-ceramic (LTCC) multi-chip-module technology. Microsystem packaging examples. **7 Hours**

UNIT - 8

CASE STUDIES: BEL pressure sensor, thermal cycler for DNA amplification, and active vibration control of a beam. **6 Hours**

PART - C

UNIT - 9

MINI-PROJECTS AND CLASS-DEMONSTRATIONS (Not For Examination)

a) CAD lab (coupled field simulation of electrostatic-elastic actuation with fluid effect)
b) BEL pressure sensor
c) Thermal-cycler for PCR
d) Active control of a cantilever beam

TEXT BOOK:

1. **MEMS & Microsystems: Design and Manufacture-** Tai-Ran Tsu, Tata Mc-Graw-Hill.
2. **"Micro and Smart Systems"** by Dr. A.K.Aatre, Prof. Ananth Suresh, Prof.K.J.Vinoy, Prof. S. Gopalakrishna,, Prof. K.N.Bhat.,John Wiley Publications
3.

REFERENCE BOOKS:

1. **Animations of working principles, process flows and processing techniques**- A CD-supplement with Matlab codes, photographs and movie clips of processing machinery and working devices.
2. **Laboratory hardware kits for-** (i) BEL pressure sensor, (ii) thermal-cycler and (iii) active control of a cantilever beam.
3. **Microsystems Design-** S. D. Senturia, 2001, Kluwer Academic Publishers, Boston, USA. ISBN 0-7923-7246-8.

4. **Analysis and Design Principles of MEMS Devices-**Minhang Bao, Elsevier, Amsterdam, The Netherlands, ISBN 0-444-51616-6.
5. **Design and Development Methodologies-**Smart Material Systems and MEMS: V. Varadan, K. J. Vinoy, S. Gopalakrishnan, Wiley.
6. **MEMS-** Nitaigour Premchand Mahalik, Tata McGraw Hill 2007.

DSP LAB

Subject Code	:	**10ITL77**	*IA Marks*	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

1. Verify the Sampling theorem.

2. Determine linear convolution, Circular convolution and Correlation of two given sequences. Verify the result using theoretical computations.

3. Determine the linear convolution of two given point sequences using FFT algorithm.

4. Determine the correlation using FFT algorithm.

5. Determine the spectrum of the given sequence using FFT.

6. Design and test FIR filter using Windowing method (Hamming window and Kaiser window) for the given order and cut-off frequency.

7. Design and test FIR filter using frequency sampling method.

8. Design and test Butterworth 1^{st} and 2^{nd} order low pass filter.

9. Design and test Butterworth 1^{st} and 2^{nd} order high pass filter.

10. Design and test Chebyshev 1^{st} and 2^{nd} order low pass filter.

11. Design and test Chebyshev 1st and 2^{nd} order high pass filter.

12. Generate and detect DTMF signal using MATLAB software only.

Note: Experiments 1-11 must be conducted using Matlab and TMS processor

PROCESS CONTROL LAB

Subject Code	:	**10ITL78**	*IA Marks*	:	25
No. of Practical Hrs./ Week	:	03	Exam Hours	:	03
Total No. of Practical Hrs.	:	42	Exam Marks	:	50

1. Rig up and test the circuit to display the temperature using RTD with suitable signal conditioning circuit.

2. Rig up and test the circuit to display the load using load cell with suitable signal conditioning circuits.

3. Using different controllers obtain the optimum response of the given temperature controller.

4. Using different controllers obtain the optimum response of the given flow controller.

5. Using different controllers obtain the optimum response of the given level controller.

6. Sequential Control experiments using PLC. The logic should be solved using ladder diagram technique.

7. Bottle filling process using PLC. The logic should be solved using ladder diagram technique.

8. Elevator using PLC. The logic should be solved using ladder diagram technique

9. Basic operations , simple programming structure using labview.

10. Creation of a CRO using VI and measurement of frequency and amplitude.

11. Creation of a digital multimeter using VI and measurement of voltage and current.

12. Design variable function generator using VI (sine, square and triangle)

13. Data acquisition using VI for temperature measurement with thermo couple and AD590

VIII SEMESTER
LASERS & OPTICAL INSTRUMENTATION

Subject Code	:	**10IT81**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

LASERS: Principles, classification, construction of Ruby, He-Ne, Nd-YAG, semiconductor, Argon and Carbon dioxide lasers.

7 Hours

UNIT - 2

Characteristics of stabilization, Q-switching and mode locking, frequency stabilization,

6 Hours

UNIT - 3

Line shape function, lasing threshold, application of lasers in engineering and medicine, safety with lasers.

6 Hours

UNIT - 4

LASER INSTRUMENTS: Laser interferometry, laser strain gauges, velocimetry, pulse echo technique, beam modulation telemetry and holography, application of holography, laser welding, laser machining and laser spectroscopy

7 Hours

PART - B

UNIT - 5

OPTOELECTRONIC DEVICES AND COMPONENTS: Photo diodes, PIN diodes, solar cells, LED's phototransistors, opto-isolators, photo-couplers.

6 Hours

UNIT - 6

FIBER OPTICS: Light Modulation schemes, optical fibers, intermodal dispersion, graded index fiber, low dispersive fibers

7 Hours

UNIT - 7

Fiber losses, fiber materials, integrated optics, optical bistability, laser printing, optical multiplexers.

6 Hours

UNIT - 8

OPTICAL FIBER SENSORS: Multimode passive and active fiber sensors, phasemodulated sensors, fiber optic gyroscope, Polarization: polarimetric sensors, polarization, and rotation sensors

7 Hours

TEXT BOOKS:

1. **Optoelectronics-**Wilson & Hawkes, Prentice Hall of India.
2. **Laser principles and applications-**Wilson and Hawkes, Prentice Hall of India.

REFERENCE BOOKS:

1. **Essentials of Opto Electronics with Applications-** A.J.Rogers, CRC Press.
2. **Principles of Optical Communication & Opto Electronics-** I.Ravikuamar, Bala N.Saraswathi, Lakshmi Publications.
3. **Optoelectronics Devices & Systems-** Guptha, Prentice Hall of India.

NEURAL NETWORKS AND FUZZY LOGIC

Subject Code	:	**10IT82**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: What is neural network? Human Brain, Models of a Neuron, Neural Networks viewed as directed graphs, Feedback, Network architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

6 Hours

UNIT - 2

LEARNING PROCESSES: Introduction, Error correction algorithm, Memory based learning, Hebbian Learning, Competitive learning, Boltzmann learning, learning with a teacher, learning without a teacher, Learning tasks, Memory, adaptation.

6 Hours

UNIT - 3

SINGLE LAYER PERCEPTIONS: Introduction, Perceptron, and perception convergence theorem, Examples. Multilayer perceptron: Introduction, Some preliminaries.

7 Hours

UNIT - 4

Back Propagation Algorithm, Summary of the Back Propagation Algorithm, XOR Problem, and Heuristics for making the Back propagation algorithm to perform better.

7 Hours

PART - B

UNIT - 5

RADIAL BASIS FUNCTION NETWORKS: Architecture, learning algorithms, Applications. Hopfield Networks – Architecture, Capacity of Hopfield models, Energy analysis of Hopfield networks.

7 Hours

UNIT - 6

INTRODUCTION: Uncertainty and Imprecision, state and random processes, Uncertainty in information, fuzzy sets and classical sets, properties, mapping of classical sets to function, fuzzy set operation, properties of Fuzzy sets, Sets as points in Hypercubes.

6 Hours

UNIT - 7

CLASSICAL RELATIONS AND FUZZY RELATIONS: Cartesian product, crisp relations, fuzzy relations, tolerance and equivalence relations, fuzzy tolerance, value assignments.

6 Hours

UNIT - 8

MEMBERSHIP FUNCTIONS: Features of membership functions, standard forms and boundaries, fuzzification, membership value assignment. Fuzzy to crisp conversions: lambda cuts for fuzzy sets, lambda cuts for fuzzy relations, defuzzification methods**.**

7 Hours

TEXT BOOKS:

1. **Simon Haykin, Neural Networks A comprehensive foundation-** McMillan College public company, Newyork 1994.
2. **Satish Kumar, Neural Networks –** Tata McGraw Hill 2009
3. **Fuzzy logic with engineering applications**-Timothy. J. Ross, McGraw Hill International Edition, 1997.

REFERENCE BOOKS:

1. **Introduction to Artificial Neural Systems-** Jacek M. Zurada Jaico Publishing House
2. **Artificial neural networks**-B. Yegnanarayana Prentice Hall of India 1999.
3. **Neural network design-** Martin T.Hagan, Cengage learning, 2009
4. **Neural networks and Fuzzy Systems, A Dynamical systems approach to machine intelligence**- Bart Kosko, Prentice Hall of India Publications, 2006
5. **Neural Networks using MATLAB 6**.0- S.N.Shivnandam, S.Sumathi and S.N. DeepaTata Mcgraw-Hill 2009.

6. **Fuzzy Logic, Intelligence, Control, and Information-**John Yen, Rena Langari, Pearson Education 2005.

ELECTIVE-IV (GROUP D)

PATTERN RECOGNITION

Subject Code	:	**10IT831**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION : Pattern Recognition (PR) overview , pattern recognition typical system, classification, patterns & features extraction with examples, Design cycles, Training , learning and adaptation , Pattern recognition approaches. Statistical decision theory. Probability: Introduction, probability of events, random variables, joint distributions and densities, moments of random variables, estimation of parameters from samples, minimizing risk estimators.

7 Hours

UNIT - 2

Statistical decision making: Introduction, byes theorem, multiple feature, conditionally independent feature, decision boundaries, unequal costs of error, estimation of error rates the leaving one out technique, characteristic curves, estimating the composition of populations.

6 Hours

UNIT - 3

Nonparametric decision making: introduction, histograms kernel & window estimators nearest neighbour classification techniques, adaptive decision boundaries.

7 Hours

UNIT - 4

Clustering: Introduction, hierarchil clustering, partitional clustering. Formulations of unsupervised learning problems, Clustering for Unsupervised Learning and classification.

6 Hours

PART - B

UNITS - 5

SYNTACTIC PATTERN RECOGNITION: Overview, quantifying structure in pattern description and recognition, grammar based approach, elements of formal grammar.

Structural Recognition via Parsing and other grammars; Graphical approaches to syntPR. Learning Via Grammatical inference.

7 Hours

UNIT - 7

Neural Pattern Recognition: Introduction to neural networks, Neural network for PR applications, Physical neural networks, Artificial neural network model. Introduction to neural pattern associators and matrix approaches and examples.

7 Hours

UNIT – 7 & 8

Feedforward networks and training by backpropagation: Introduction, Multilayer, Feedforward structure, Training the feedforward netwoek, Examples, Unsupervised Learning in NeurPR: Hopefield approach to neural computing, Examples,

12 Hours

TEXT BOOKS:

1. Pattern Recognition and image analysis – Earl Gose, PHI, 2002
2. Robert Schalkoff, Pattern Recognition : Statistical, **structural and Neural Approaches**, John Wiley and Sons, Inc. 1992.

Reference :

1. Pattern Classification- Richard O. Duda, peter E. Hart and David G Stork John Wiley and Sons, Inc 2nd Ed. 2001.

SPEECH SIGNAL PROCESSING

Subject Code	:	**10IT832**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

DIGITAL MODELS FOR SPEECH SIGNALS: Process of Speech Production, Acoustic phonetics, Digital models for Speech signals.

6 Hours

UNIT - 2

TIME DOMAIN MODELS FOR SPEECH PROCESSING: Time dependent processing of speech, Short time Energy and average magnitude, Short time average zero crossing rate, Speech Vs silence discrimination using energy and zero crossing. Pitch period estimation, Short time autocorrelation function, Short time average magnitude difference function, Pitch period estimation using autocorrelation function.

7 Hours

UNIT - 3

SHORT TIME FOURIER ANALYSIS: Linear filtering interpretation, Filter bank summation method, Design of digital filter banks, Spectrographic displays. Cepstrum analysis.

7 Hours

UNIT - 4

DIGITAL REPRESENTATIONS OF THE SPEECH WAVEFORM: Sampling speech signals, Review of the statistical model for speech, Instantaneous quantization, Adaptive Quantization, General theory of differential quantization, Delta modulation.

6 Hours

PART - B

UNIT - 5

LINEAR PREDICTIVE CODING OF SPEECH: Basic principles of linear predictive analysis, Solution of LPC equations, Prediction error signal, Frequency domain interpretation, Applications of LPC parameters**.**

7 Hours

UNIT - 6

SPEECH SYNTHESIS: Principles of Speech synthesis, Synthesis based on waveform coding, analysis synthesis method, speech production mechanism, Synthesis by rule, Text to speech conversion.

6 Hours

UNIT – 7

SPEECH RECOGNITION: Principles of Speech recognition, Speech period detection, Spectral distance measures, Structure of word recognition systems, Dynamic time warping (DTW), Word recognition using phoneme units, HMM.

7 Hours

UNIT – 8

SPEAKER RECOGNITION: Principles of Speaker recognition, Speaker recognition methods, examples of speaker recognition system.

6 Hours

TEXT BOOKS:

1. **Digital Processing of Speech Signals-** L R Rabiner and R W Schafer, Pearson Education 2004.
2. **Digital Speech Processing-** Synthesis and Recognition, Sadoaki Furui, 2nd Edition, Mercel Dekker 2002.

REFERENCE BOOKS:

1. **Introduction to Data Compression**- Khalid Sayood, 3rd Edition, Elsivier Publications.
2. **Digital Speech**-A M Kondoz, 2nd Edition, Wiley Publications.

INDUSTRIAL INSTRUMENTATION

Subject Code	:	**10IT833**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

MEASUREMENTS OF MOISTURE AND HUMIDITY: Classification of Measurement Techniques, Measurement of Moisture and Humidity in gases, Measurement of Moisture and humidity over liquids, Measurement of Moisture and humidity over solids **6 Hours**

UNIT – 2

MEASUREMENTS OF DENSITY AND VISCOSITY: Newtonian and Non-Newtonian fluids, Classification of Density measurement techniques, Classification of Viscosity Measurement Techniques, Measurement of density, Measurement of Viscosity.

7 Hours

UNIT - 3

MEASUREMENT OF SPEED, ACCELERATION and VIBRATION

Classification of Tachometers, Revolution counter, Centrifugal force tachometers, Eddy-current tachometers, D.C. Tachogenerator, A.C. Tachogenerator, stroboscopic Tachometer, Seismic Displacement pickups, Seismic velocity Pickup, Piezoelectric accelerometer, Vibration Wedge amplitude indicator, Electromechanical Absolute Vibration pickup.

7 Hours

UNIT – 4

MEASUEMENT OF SOUND: Measurement of sound, Sound parameters, Classification of Sound-Measuring methods

6 Hours

PART - B

UNIT – 5

Food industry instrumentation, Instrumentation in brewing, canning industry, baking, dairy industries.

7 Hours

UNIT - 6

Paper and Pulp Instrumentation**:** Different types of pulping, pulp bleaching, pulp blending, wet end and drier instrumentation.

6 Hours

UNIT - 7

Steam power plant instrumentation, Instrument selection, primary and secondary plant measurement

6 Hours

UNIT - 8

Aerospace Instrumentation**:** Air craft's and aerospace vehicle instrumentation, air flight simulation instrumentation.

7 Hours

TEXT BOOK:

1. Principles of Industrial Instrumentation and Control Systems-Chennakesava R.Alavala, Cengage Learning
2. **Hand book of applied instrumentation**-CONSIDINE and ROSS, Publisher McGraw-Hill.

REFERENCE BOOKS:

1. **Industrial instrumentation-** by DONALD P. ECKMAN, Wiley
2. **Industrial Instruments**- by K.Krishnaswamy, S.Vijayachitra, New age International publishers.
3. **Food Processing Principles & Applications**- J.S.Smith, University press (US) 2004.
4. **Process Control Fundamentals for the pulpe**-paper Industry.-Nancy Jean Sell, Tappi(June 1997) ISBN-978-0898522945.

5. **Industrial Instrumentation and control " 3rd edition, S**.K.Singh TMH 2009

WAVELET TRANSFORMS

Subject Code	:	**10IT834**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

MATHEMATICAL PRELIMINARIES: Linear spaces, Vector and vector spaces, basic functions, matrix algebra & linear transformations, Fourier series, properties And examples of Fourier transforms

6 Hours

UNIT - 2

TIME FREQUENCY ANALYSIS: Window function, STFT, Discrete STFT, discrete Gabor representation, Continuous wavelet transform, discrete wavelet transform, wavelet series, WVD and its properties.

7 Hours

UNIT - 3

CONTINUOUS WAVELET TRANSFORMS: Continuous time wavelets, CWT as correlation, filter and time resolution operation. Inverse CWT.

7 Hours

UNIT - 4

DISCRETE WAVELET TRANSFORM: Introduction, vector approximations in nested linear vector subspaces, multi resolution analysis.

6 Hours

PART - B

UNIT - 5

MRA, ORTHONORMAL WAVELETS: Introduction, Definition of MRA, Construction of orthonormal MRA, wavelet basics for MRA, digital filter interpretation, examples of orthogonal basics generating wavelets, MRA interpretation for discrete time signals.

7 Hours

UNIT - 6

WAVELET APPLICATIONS: Data compression; introduction, transform coding, DTWT for image compression, Audio compression.

7 Hours

UNIT - 7

WAVELET DENOISING: speckle removal, edge detection & object isolation, image fusion.

6 Hours

UNIT - 8

WAVELET PACKETS: Wavelet packet algorithms, Thresholding, 2D wavelets, wavelet packet algorithms for 2D signals, 3D medical image visualization.

6 Hours

TEXT BOOKS:

1. **Fundamentals of Wavelets: theory**-algorithms & applications Goswami and Chan, John Wiley & Sons, 1999.
2. **Introduction to theory and applications** – Wavelet transforms Raghuveer M Rao, Ajit S Bopardikar, Pearson LPE, 2006.

REFERENCE BOOKS:

1. **Introduction to wavelets and wavelet transforms-**A Primer – C Sidney Burrus, Ramesh A Gopinath, Guo, Prentice Hall Inc, 1998.
2. **Wavelet Theory and its applications**-Randy K Young, Kluwer publications, 1963.
3. **Insight into Wavelets: from theory to practice-Soman, 3rd edition,** Prentice Hall India.

ELECTIVE-V (GROUP E)
LOW POWER VLSI DESIGN

Subject Code	:	**10IT841**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION: Need for low power VLSI chips, Sources of power dissipation on Digital Integrated circuits. Emerging Low power approaches, Physics of power dissipation in CMOS devices.

6 Hours

UNIT - 2

DEVICE & TECHNOLOGY IMPACT ON LOW POWER: Dynamic dissipation in CMOS, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation.

7 Hours

UNIT - 3

POWER ESTIMATION, SIMULATION POWER ANALYSIS: SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power, gate level capacitance estimation, architecture level analysis, data correlation analysis in DSP systems, Monte Carlo simulation.

7 Hours

UNIT - 4

PROBABILISTIC POWER ANALYSIS: Random logic signals, probability & frequency, probabilistic power analysis techniques, signal entropy. Circuit level: Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library.

6 Hours

PART - B

UNIT - 5

LOGIC LEVEL: Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic.

6 Hours

UNIT - 6

LOW POWER ARCHITECTURE & SYSTEMS: Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design.

7 Hours

UNIT - 7

LOW POWER CLOCK DISTRIBUTION: Power dissipation in clock distribution, single driver Vs distributed buffers, Zero skew Vs tolerable skew, chip & package co-design of clock network

7 Hours

UNIT - 8

ALGORITHM & ARCHITECTURAL LEVEL METHODOLOGIES: Introduction, design flow, Algorithmic level analysis & optimization, Architectural level estimation & synthesis.

6 Hours

TEXT BOOKS:

1. **Practical Low Power Digital VLSI Design**-Gary K. Yeap, KAP, 2002
2. **Low power design methodologies Rabaey, Pedram**-Kluwer Academic, 1997.

REFERENCE BOOK:

1. **Low-Power CMOS VLSI Circuit Design**-Kaushik Roy, Sharat Prasad, Wiley, 2000.

BIOMEDICAL DSP

Subject Code	:	**10IT842**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

INTRODUCTION TO BIOMEDICAL SIGNALS: The nature of biomedical signals, The action potential, objectives of biomedical signal analysis, Difficulties in biomedical signal analysis, computer aided diagnosis.

7 Hours

UNIT - 2

NEUROLOGICAL SIGNAL PROCESSING: **The brain and its potentials, The electrophysiological origin of brain waves, The EEG signal and its characteristics, EEG analysis.**

6 Hours

UNIT - 3

LINEAR PREDICTION THEORY: **The Autoregressive (AR) method, Recursive estimation of AR parameters, Spectral error measure, Adaptive segmentation, Transient detection and elimination- the case of epileptic patients, overall performance.**

7 Hours

UNIT - 4

SLEEP EEG: **Data acquisition and classification of sleep stages, The Markov model and Markov chains, Dynamics of sleep-wake transitions, Hypnogram model parameters, Event history analysis for modeling sleep.**

6 Hours

PART - B

UNIT - 5

ADAPTIVE INTERFERENCE/NOISE CANCELLATION : **A review of Wiener filtering problem, Principle of an Adaptive filter, The steepest-descent algorithm, the Widrow-Hoff least mean square adaptive algorithm, Adaptive noise canceller, Cancellation of 60Hz interference in ECG, Canceling Donor-heart interference in Heart-transplant electrocardiography, Cancellation of ECG signal from the electrical activity of the chest muscles, canceling of maternal ECG in fetal ECG, Cancellation of High frequency noise in Electro-surgery.**

7 Hours

UNIT - 6

CARDIOLOGICAL SIGNAL PROCESSING: Basic Electrocardiography, ECG data acquisition, ECG lead system, ECG parameters and their estimation, The use of multi-scale analysis for parameter estimation of ECG waveforms, Arrhythmia analysis monitoring, long term continuous ECG recording.

6 Hours

UNIT - 7

ECG DATA REDUCTION TECHNIQUES: Direct data compression techniques, Direct ECG data compression techniques, Transformation compression techniques, Transformation compression techniques, other data compression techniques, Data compression techniques comparison.

7 Hours

UNIT - 8

PRONY'S METHOD: Exponential modeling, Exponential parameter estimation, The original Prony problem, Least squares prony method, The covariance method of linear prediction, Prony's method in the presence of noise, clinical application of prony's method.

6 Hours

TEXT BOOKS:

1. **Biomedical Signal Processing Principles and Techniques-** by D C Reddy, The McGraw-Hill publications.
2. **Biomedical Signal Analysis a case study approaches**- by Rangaraj M. Rangayyan The John Wiley publications.

REFERENCE BOOK:

1. **Biomedical Digital Signal Processing-**by Willis J. Tompkins, The Prentice Hall of India publications.

MOBILE COMMUNICATION

Subject Code	:	**10IT843**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

WIRELESS TRANSMISSION: Frequencies for radio transmission, signals, antennas, signal propagation, multiplexing, modulation, spread spectrum.

6 Hours

UNIT - 2

MEDIUM ACCESS CONTROL: Motivation for a specialized MAC, SDMA, FDMA, TDMA, fixed TDM, Classical aloha, slotted aloha carrier sense multiple access, PRMS packet reservation multiple access, Reservation TDMA, multiple access with collision avoidance, polling inhibit sense multiple access, CDMA, spread aloha multiple access, Comparison.

7 Hours

UNIT - 3

TELECOMMUNICATIONS SYSTEMS: GSM, mobile services, system architecture, radio interface, protocols, localization and calling, handover, security, new data services, DECT, system architecture TETRA, UMTS and IMT-2000, UMTS releases and standardization, architecture, radiointerface, UTRAN, corenetwork

7 Hours

UNIT - 4

SATELLITE SYSTEMS: Basics GEO, LEO, MEO, Routing, localization, handover.

BROADCAST SYSTEMS: Cyclic repetition of data, digital audio broadcasting, digital video broadcasting, convergence of broadcasting and mobile communications.

6 Hours

PART - B

UNIT - 5

WIRELESS LAN: Infrared Vs radio transmission, infrastructure and ad-hoc network, IEEE802.11, HIPERLSN, Blue tooth.

6 Hours

UNIT - 6

MOBILE NETWORK LAYER: Mobile IP, Goals, assumptions and requirements, entities and terminology, IP packet delivery, agent discovery, registration, tunneling and encapsulation, optimizations, reverse tunneling, PIV6 343, IP micro- mobility support.

7 Hours

UNIT - 7

Dynamic host configuration, protocol, mobile ad-hoc networks Routing, destination sequence distance vector, Dynamic source routing, alternative metrics, overview.

6 Hours

UNIT - 8

MOBILE TRANSPORT LAYER: Traditional TCP, Congestion control, slow start, fast retransmit/ fast recovery, implications of mobility, Classical TCP in improvements, indirect TCP, Snooping, mobile, Fast retransmit/ fast recovery, Transmission/time-out freezing, selective retransmission, Transaction-oriented TCP, TCP over 2.5/3G wireless networks.

7 Hours

TEXT BOOK:

1. **Mobile Communications**-2nd Edition, JOCHEN SCHILER, Pearson Education. 2003

REFERENCE BOOKS:

1. **Mobile Communications engineering, Theory and applications**-2nd Edition, WILLIM C.Y. LEE, McGraw-Hill, 1997, Singapore.
2. **Introduction to Wireless and Mobile Systems**-Second edition, Dharma Prakash Agarwal, Qing An Zeng, 2nd Edition, THOMSON, 2007.
3. **Electronic Communications systems Fundamentals through advanced**-5th Edition, Wayne Tomasi, Pearson education 2007.

SMART SENSORS

Subject Code	:	**10IT844**	*IA Marks*	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

Part - A

UNIT - 1

BASICS OF SMART SENSORS & MICROMACHINING: Introduction, Mechanical-Electronic transitions in sensing, nature of sensors, overview of smart sensing and control systems, integration of micromachining and microelectronics, introduction to micromachining, bulk micromachining, wafer bonding, surface micromachining, other micromachining techniques.

7 Hours

UNIT - 2

SENSOR INFORMATION TO MCU: Introduction, amplification and signal conditioning, separate versus integrated signal conditioning, digital conversion.

6 Hours

UNIT - 3

MCUS AND DSPS TO INCREASE SENSOR IQ: Introduction, MCU control, MCUs for sensor interface, DSP control, Software, tools and support, sensor integration.

6 Hours

UNIT - 4

COMMUNICATIONS FOR SMART SENSORS : Introduction, definitions and background, sources and standards, automotive protocols, industrial networks, office & building automation, home automation, protocols in silicon, other aspects of network communications.

7 Hours

PART - B

UNIT - 5

CONTROL TECHNIQUES: Introduction, state machines, fuzzy logic, neural networks, combined fuzzy logic and neural networks, adaptive control, other control areas.

6 Hours

UNIT - 6

SENSOR COMMUNICATION & MEMS: Wireless zone sensing, surface acoustical wave devices, intelligent transportation system, RF-ID, Microoptics, microgrippers, microprobes, micromirrors, FEDs.

7 Hours

UNIT - 7

PACKAGING, TESTING AND RELIABILITY OF SMART SENSORS: Introduction, Semiconductor packaging applied to sensors, hybrid packaging, packaging for monolithic sensors, reliability implications, testing smart sensors. Unit Standards for Smart Sensors: Introduction, setting the standards for smart sensors and systems, IEEE 1451.1, IEEE 1451.2, IEEE P1451.3, IEEE 1451.4, extending the systems to network**.**

7 Hours

UNIT - 8

IMPLICATIONS OF SMART SENSOR STANDARDS AND RECENT TRENDS: Introduction, sensor plug-and-play, communicating sensor data via existing wiring, automated/remote sensing and web, process control over the internet, alternative standards, HVAC sensor chip, MCU with integrated pressure sensors, alternative views of smart sensing, smart loop.

6 Hours

TEXT BOOK:

1. **Understanding Smart Sensors**- Randy Frank, 2nd Edition. Artech House Publications, 2000.

REFERENCE BOOK:

1. **Smart Sensors**- Paul W. Chapman, ISA Press.

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