V SEMESTER

MANAGEMENT & ENTREPRENEURSHIP

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

MANAGEMENT

UNIT - 1

MANAGEMENT: Introduction - Meaning - nature and characteristics of Management, Scope and functional areas of Management - Management as a Science, Art or Profession Management & Administration - Roles of Management, Levels of Management, Development of Management Thought-Early Management Approaches-Modern Management Approaches.

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.

UNIT - 3

ORGANISING AND STAFFING: Nature and purpose of organization - Principles of organization - Types of organization - Departmentation - Committees – Centralisation Vs Decentralisation of authority and responsibility - Span of control - MBO and MBE (Meaning only) Nature and importance of Staffing - Process of Selection & Recruitment (in brief).

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.

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.

UNIT - 6

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

UNIT - 7

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

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.

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** - Small Business Enterprises - Poornima M Charantimath - Pearson Education – 2006.

REFERENCE BOOKS:

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

DIGITAL SIGNAL PROCESSING

Subject Code	: **10EC52**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

Discrete Fourier Transforms (DFT): Frequency domain sampling and reconstruction of discrete time signals. DFT as a linear transformation, its relationship with other transforms.

UNIT - 2

Properties of DFT, multiplication of two DFTs- the circular convolution, additional DFT properties, use of DFT in linear filtering, overlap-save and overlap-add method.

UNIT - 3

Fast-Fourier-Transform (FFT) algorithms: Direct computation of DFT, need for efficient computation of the DFT (FFT algorithms).

UNIT - 4

Radix-2 FFT algorithm for the computation of DFT and IDFT–decimation-in-time and decimation-in-frequency algorithms. Goertzel algorithm, and chirp-z transform

UNIT - 5

IIR filter design: Characteristics of commonly used analog filters – Butterworth and Chebysheve filters, analog to analog frequency transformations.

UNIT - 6

FIR filter design: Introduction to FIR filters, design of FIR filters using - Rectangular, Hamming, Bartlet and Kaiser windows, FIR filter design using frequency sampling technique

UNIT - 7

Design of IIR filters from analog filters (Butterworth and Chebyshev) - impulse invariance method. Mapping of transfer functions: Approximation of derivative (backward difference and bilinear transformation) method, Matched z transforms, Verification for stability and linearity during mapping

UNIT - 8

Implementation of discrete-time systems: Structures for IIR and FIR systems-direct form I and direct form II systems, cascade, lattice and parallel realization.

TEXT BOOK:

1. **Digital signal processing – Principles Algorithms & Applications**, Proakis & Monalakis, Pearson education, 4th Edition, New Delhi, 2007.

REFERENCE BOOKS:

1. **Discrete Time Signal Processing**, Oppenheim & Schaffer, PHI, 2003.
2. **Digital Signal Processing**, S. K. Mitra, Tata Mc-Graw Hill, 3rd Edition, 2010.
3. **Digital Signal Processing**, Lee Tan: Elsivier publications, 2007

ANALOG COMMUNICATION

Subject Code	: **10EC53**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

RANDOM PROCESS: Random variables: Several random variables. Statistical averages: Function of Random variables, moments, Mean, Correlation and Covariance function: Principles of autocorrelation function, cross – correlation functions. Central limit theorem, Properties of Gaussian process.

UNIT - 2

AMPLITUDE MODULATION: Introduction, AM: Time-Domain description, Frequency – Domain description. Generation of AM wave: square law modulator, switching modulator. Detection of AM waves: square law detector, envelop detector. Double side band suppressed carrier modulation (DSBSC): Time-Domain description, Frequency-Domain representation, Generation of DSBSC waves: balanced modulator, ring modulator. Coherent detection of DSBSC modulated waves. Costas loop.

UNIT - 3

SINGLE SIDE-BAND MODULATION (SSB): Quadrature carrier multiplexing, Hilbert transform, properties of Hilbert transform, Pre-envelope, Canonical representation of band pass signals, Single side-band

modulation, Frequency-Domain description of SSB wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave. Demodulation of SSB waves.

UNIT - 4

VESTIGIAL SIDE-BAND MODULATION (VSB): Frequency – Domain description, Generation of VSB modulated wave, Time - Domain description, Envelop detection of VSB wave plus carrier, Comparison of amplitude modulation techniques, Frequency translation, Frequency division multiplexing, Application: Radio broadcasting, AM radio.

UNIT - 5

ANGLE MODULATION (FM)-I: Basic definitions, FM, narrow band FM, wide band FM, transmission bandwidth of FM waves, generation of FM waves: indirect FM and direct FM.

UNIT - 6

ANGLE MODULATION (FM)-II: Demodulation of FM waves, FM stereo multiplexing, Phase-locked loop, Nonlinear model of the phase – locked loop, Linear model of the phase – locked loop, Nonlinear effects in FM systems.

UNIT - 7

NOISE: Introduction, shot noise, thermal noise, white noise, Noise equivalent bandwidth, Narrow bandwidth, Noise Figure, Equivalent noise temperature, cascade connection of two-port networks.

UNIT - 8

NOISE IN CONTINUOUS WAVE MODULATION SYSTEMS: Introduction, Receiver model, Noise in DSB-SC receivers, Noise in SSB receivers, Noise in AM receivers, Threshold effect, Noise in FM receivers, FM threshold effect, Pre-emphasis and De-emphasis in FM,.

TEXT BOOKS:

1. **Communication Systems**, Simon Haykins, 3rd Edition, John Willey, 1996.
2. **An Introduction to Analog and Digital Communication**, Simon Haykins, John Wiley, 2003.

REFERENCE BOOKS:

1. **Modern digital and analog Communication systems** B. P. Lathi, 3rd ed 2005 Oxford University press.

2. **Communication Systems**, Harold P.E, Stern Samy and A Mahmond, Pearson Edn, 2004.
3. **Communication Systems**: Singh and Sapre**:** Analog and digital TMH 2nd , Ed 2007.

MICROWAVES AND RADAR

Subject Code	: **10EC54**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

MICROWAVE TRANSMISSION LINES: Introduction, transmission lines equations and solutions, reflection and transmission coefficients, standing waves and SWR, line impedance and line admittance. Smith chart, impedance matching using single stubs, Microwave coaxial connectors.

UNIT - 2

MICROWAVE WAVEGUIDES AND COMPONENTS: Introduction, rectangular waveguides, circular waveguides, microwave cavities, microwave hybrid circuits, directional couplers, circulators and isolators.

UNIT - 3

MICROWAVE DIODES,

Transfer electron devices: Introduction, GUNN effect diodes – GaAs diode, RWH theory, Modes of operation, Avalanche transit time devices: READ diode, IMPATT diode, BARITT diode, Parametric amplifiers

Other diodes: PIN diodes, Schottky barrier diodes.

UNIT - 4

Microwave network theory and passive devices. Symmetrical Z and Y parameters, for reciprocal Networks, S matrix representation of multi port networks.

UNIT - 5

Microwave passive devices, Coaxial connectors and adapters, Phase shifters, Attenuators, Waveguide Tees, Magic tees.

UNIT - 6

STRIP LINES: Introduction, Microstrip lines, Parallèle strip lines, Coplanar strip lines, Shielded strip Lines.

UNIT - 7

AN INTRODUCTION TO RADAR: Basic Radar, The simple form of the Radar equation, Radar block diagram, Radar frequencies, application of Radar, the origins of Radar.

UNIT - 8

MTI AND PULSE DOPPLER RADAR: Introduction to Doppler and MTI Radar, delay line Cancellers, digital MTI processing, Moving target detector, pulse Doppler Radar.

TEXT BOOKS:

1. **Microwave Devices and circuits**- Liao / Pearson Education.
2. **Introduction to Radar systems**-Merrill I Skolnik, 3rd Ed, TMH, 2001.
3. **Microwave Engineering** – Annapurna Das, Sisir K Das TMH Publication, 2nd , 2010.

REFERENCE BOOK:

1. **Microwave Engineering** – David M Pozar, John Wiley, 2e, 2004.

DIGITAL SWITCHING SYSTEMS

Subject Code	: **10EC55**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

Developments of telecommunications, Network structure, Network services, terminology, Regulation, Standards. Introduction to telecommunications transmission, Power levels, Four wire circuits, Digital transmission, FDM, TDM, PDH and SDH, Transmission performance.

UNIT - 2

EVOLUTION OF SWITCHING SYSTEMS: Introduction, Message switching, Circuit switching, Functions of switching systems, Distribution systems, Basics of crossbar systems, Electronic switching, Digital switching systems.

DIGITAL SWITCHING SYSTEMS: Fundamentals : Purpose of analysis, Basic central office linkages, Outside plant versus inside plant, Switching system hierarchy, Evolution of digital switching systems, Stored program

control switching systems, Digital switching system fundamentals, Building blocks of a digital switching system, Basic call processing.

UNIT - 3

TELECOMMUNICATIONS TRAFFIC: Introduction, Unit of traffic, Congestion, Traffic measurement, Mathematical model, lost call systems, Queuing systems.

UNIT - 4

SWITCHING SYSTEMS: Introduction, Single stage networks, Gradings, Link Systems, GOS of Linked systems.

UNIT - 5

TIME DIVISION SWITCHING: Introduction, space and time switching, Time switching networks, Synchronisation.

UNIT - 6

SWITCHING SYSTEM SOFTWARE: Introduction, Scope, Basic software architecture, Operating systems, Database Management, Concept of generic program, Software architecture for level 1 control, Software architecture for level 2 control, Software architecture for level 3 control, Digital switching system software classification, Call models, Connect sequence, Software linkages during call, Call features, Feature flow diagram, Feature interaction.

UNIT - 7

MAINTENANCE OF DIGITAL SWITCHING SYSTEM: Introduction, Scope, Software maintenance, Interface of a typical digital switching system central office, System outage and its impact on digital switching system reliability, Impact of software patches on digital switching system maintainability, Embedded patcher concept, Growth of digital switching system central office, Generic program upgrade, A methodology for proper maintenance of digital switching system, Effect of firmware deployment on digital switching system, Firmware-software coupling, Switching system maintainability metrics, Upgrade process success rate, Number of patches applied per year, Diagnostic resolution rate, Reported critical and major faults corrected, A strategy improving software quality, Program for software process improvement, Software processes improvement, Software processes, Metrics, Defect analysis, Defect analysis.

UNIT - 8

A GENERIC DIGITAL SWITCHING SYSTEM MODEL: Introduction, Scope, Hardware architecture, Software architecture, Recovery strategy,

Simple call through a digital system, Common characteristics of digital switching systems. Analysis report. Reliability analysis.

TEXT BOOKS:

1. **Telecommunication and Switching, Traffic and Networks** - J E Flood**:** Pearson Education, 2002.
2. **Digital Switching Systems**, Syed R. Ali, TMH Ed 2002.

REFERENCE BOOK:

1. **Digital Telephony** - John C Bellamy: Wiley India 3rd Ed, 2000.

FUNDAMENTALS OF CMOS VLSI

Subject Code	: **10EC56**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

BASIC MOS TECHNOLOGY: Integrated circuit's era. Enhancement and depletion mode MOS transistors. nMOS fabrication. CMOS fabrication. Thermal aspects of processing. BiCMOS technology. Production of E-beam masks.

MOS TRANSISTOR THEORY: Introduction, MOS Device Design Equations, The Complementary CMOS Inverter – DC Characteristics, Static Load MOS Inverters, The Differential Inverter, The Transmission Gate, Tristate Inverter.

UNIT - 2

CIRCUIT DESIGN PROCESSES: MOS layers. Stick diagrams. Design rules and layout – lambda-based design and other rules. Examples. Layout diagrams. Symbolic diagrams. Tutorial exercises.

Basic Physical Design of Simple logic gates.

UNIT - 3

CMOS LOGIC STRUCTURES: CMOS Complementary Logic, Bi CMOS Logic, Pseudo-nMOS Logic, Dynamic CMOS Logic, Clocked CMOS Logic, Pass Transistor Logic, CMOS Domino Logic Cascaded Voltage Switch Logic (CVSL).

UNIT - 4

BASIC CIRCUIT CONCEPTS: Sheet resistance. Area capacitances. Capacitance calculations. The delay unit. Inverter delays. Driving capacitive loads. Propagation delays. Wiring capacitances.

SCALING OF MOS CIRCUITS: Scaling models and factors. Limits on scaling. Limits due to current density and noise.

UNIT - 5

CMOS SUBSYSTEM DESIGN: Architectural issues. Switch logic. Gate logic. Design examples – combinational logic. Clocked circuits. Other system considerations.

Clocking Strategies

UNIT - 6

CMOS SUBSYSTEM DESIGN PROCESSES: General considerations. Process illustration. ALU subsystem. Adders. Multipliers.

UNIT - 7

MEMORY, REGISTERS AND CLOCK: Timing considerations. Memory elements. Memory cell arrays.

UNIT - 8

TESTABILITY: Performance parameters. Layout issues. I/O pads. Real estate. System delays. Ground rules for design. Test and testability.

TEXT BOOKS:

1. **CMOS VLSI Design – A Circuits and Systems Perspective. 3rd Edition. N.H. Weste and David Harris. Addison-Wesley, 2005. (Refer to http://www.cmosvlsi.com)**
2. **Principles of CMOS VLSI Design: A Systems Perspective**, Neil H. E. Weste, K. Eshragian, and ??? 3rd edition, Pearson Education (Asia) Pvt. Ltd., 200?. (Shift to the latest edition.)
3. **Basic VLSI Design** - Douglas A. Pucknell & Kamran Eshraghian, PHI 3rd Edition (original Edition – 1994), 2005.

REFERENCE BOOKS:

1. R. Jacob Baker. CMOS Circuit Design, Layout and Simulation. John Wiley.
2. **Fundamentals of Semiconductor Devices**, M. K. Achuthan and K. N. Bhat, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.
3. **CMOS Digital Integrated Circuits: Analysis and Design**, Sung-Mo Kang & Yusuf Leblebici, 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2007.

4. **Analysis and Design of Digital Integrated Circuits** - D.A Hodges, H.G Jackson and R.A Saleh. 3rd Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.

DIGITAL SIGNAL PROCESSING LABORATORY

Subject Code	: **10ECL57**	IA Marks	: 25
No. of Practical Hrs/Week: 03		Exam Hours	: 03
Total no. of Practical Hrs. : 42		Exam Marks	: 50

A LIST OF EXPERIMENTS USING MATLAB / SCILAB / OCTAVE / WAB

1. Verification of Sampling theorem.
2. Impulse response of a given system
3. Linear convolution of two given sequences.
4. Circular convolution of two given sequences
5. Autocorrelation of a given sequence and verification of its properties.
6. Cross correlation of given sequences and verification of its properties.
7. Solving a given difference equation.
8. Computation of N point DFT of a given sequence and to plot magnitude and phase spectrum.
9. Linear convolution of two sequences using DFT and IDFT.
10. Circular convolution of two given sequences using DFT and IDFT
11. Design and implementation of FIR filter to meet given specifications.
12. Design and implementation of IIR filter to meet given specifications.

B. LIST OF EXPERIMENTS USING DSP PROCESSOR

1. Linear convolution of two given sequences.
2. Circular convolution of two given sequences.
3. Computation of N- Point DFT of a given sequence
4. Realization of an FIR filter (any type) to meet given specifications .The input can be a signal from function generator / speech signal.
5. Audio applications such as to plot time and frequency (Spectrum) display of Microphone output plus a cosine using DSP. Read a wav file and match with their respective spectrograms
6. Noise: Add noise above 3kHz and then remove; Interference suppression using 400 Hz tone.
7. Impulse response of first order and second order system

REFERENCE BOOKS:

1. **Digital signal processing using MATLAB -** Sanjeet Mitra, TMH, 2001
2. **Digital signal processing using MATLAB** - J. G. Proakis & Ingale, MGH, 2000

3. **Digital Signal Processors**, B. Venkataramani and Bhaskar, TMH,2002

ANALOG COMMUNICATION LAB + LIC LAB

Subject Code	: **10ECL58**	IA Marks	: 25
No. of Practical Hrs/Week	: 03	Exam Hours	: 03
Total no. of Practical Hrs.	: 42	Exam Marks	: 50

EXPERIMENTS USING DESCERTE COMPONENTS and LABVIEW - 2009 CAN BE USED FOR VERIFICATION AND TESTING.

1. Second order active LPF and HPF
2. Second order active BPF and BE
3. Schmitt Trigger Design and test a Schmitt trigger circuit for the given values of UTP and LTP
4. Frequency synthesis using PLL.
5. Design and test R-2R DAC using op-amp
6. Design and test the following circuits using IC 555
    a. Astable multivibrator for given frequency and duty cycle
    b. Monostable multivibrator for given pulse width W
7. Class C Single tuned amplifier
8. Amplitude modulation using transistor/FET (Generation and detection)
9. Pulse amplitude modulation and detection
10. PWM and PPM
11. Frequency modulation using 8038/2206
12. Precision rectifiers – both Full Wave and Half Wave.

VI SEMESTER

DIGITAL COMMUNICATION

Subject Code	: **10EC61**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

Basic signal processing operations in digital communication. Sampling Principles: Sampling Theorem, Quadrature sampling of Band pass signal, Practical aspects of sampling and signal recovery.

UNIT - 2

PAM, TDM. Waveform Coding Techniques, PCM, Quantization noise and SNR, robust quantization.

UNIT - 3

DPCM, DM, applications. Base-Band Shaping for Data Transmission, Discrete PAM signals, power spectra of discrete PAM signals.

UNIT - 4

ISI, Nyquist's criterion for distortion less base-band binary transmission, correlative coding, eye pattern, base-band M-ary PAM systems, adaptive equalization for data transmission.

UNIT - 5

DIGITAL MODULATION TECHNIQUES: Digital Modulation formats, Coherent binary modulation techniques, Coherent quadrature modulation techniques. Non-coherent binary modulation techniques.

UNIT - 6

Detection and estimation, Model of DCS, Gram-Schmidt Orthogonalization procedure, geometric interpretation of signals, response of bank of correlators to noisy input.

UNIT - 7

Detection of known signals in noise, correlation receiver, matched filter receiver, detection of signals with unknown phase in noise.

UNIT - 8

Spread Spectrum Modulation: Pseudo noise sequences, notion of spread spectrum, direct sequence spread spectrum, coherent binary PSK, frequency

hop spread spectrum, applications.

TEXT BOOK:

1. **Digital communications**, Simon Haykin, John Wiley, 2003.

REFERENCE BOOKS:

1. **Digital and analog communication systems & An introduction to Analog and Digital Communication**, K. Sam Shanmugam, John Wiley, 1996. 2.Simon Haykin, John Wiley, 2003
2. **Digital communications** - Bernard Sklar: Pearson education 2007

MICROPROCESSOR

Subject Code	: **10EC62**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

8086 PROCESSORS: Historical background, The microprocessor-based personal computer system, 8086 CPU Architecture, Machine language instructions, Instruction execution timing, The 8086

UNIT - 2

INSTRUCTION SET OF 8086: Assembler instruction format, data transfer and arithmetic, branch type, loop, NOP & HALT, flag manipulation, logical and shift and rotate instructions. Illustration of these instructions with example programs, Directives and operators

UNIT - 3

BYTE AND STRING MANIPULATION: String instructions, REP Prefix, Table translation, Number format conversions, Procedures, Macros, Programming using keyboard and video display

UNIT - 4

8086 INTERRUPTS: 8086 Interrupts and interrupt responses, Hardware interrupt applications, Software interrupt applications, Interrupt examples

UNIT - 5

8086 INTERFACING: Interfacing microprocessor to keyboard (keyboard types, keyboard circuit connections and interfacing, software keyboard interfacing, keyboard interfacing with hardware), Interfacing to alphanumeric

displays (interfacing LED displays to microcomputer), Interfacing a microcomputer to a stepper motor

UNIT - 6

8086 BASED MULTIPROCESSING SYSTEMS: Coprocessor configurations, The 8087 numeric data processor: data types, processor architecture, instruction set and examples

UNIT - 7

SYSTEM BUS STRUCTURE: Basic 8086 configurations: minimum mode, maximum mode, Bus Interface: peripheral component interconnect (PCI) bus, the parallel printer interface (LPT), the universal serial bus (USB)

UNIT - 8

80386, 80486 AND PENTIUM PROCESSORS: Introduction to the 80386 microprocessor, Special 80386 registers, Introduction to the 80486 microprocessor, Introduction to the Pentium microprocessor.

TEXT BOOKS:

1. **Microcomputer systems-The 8086 / 8088** Family – Y.C. Liu and G. A. Gibson, 2E PHI -2003
2. **The Intel Microprocessor, Architecture, Programming and Interfacing**-Barry B. Brey, 6e, Pearson Education / PHI, 2003

REFERENCE BOOKS:

1. **Microprocessor and Interfacing- Programming & Hardware**, Douglas hall, 2nd , TMH, 2006.
2. **Advanced Microprocessors and Peripherals** - A.K. Ray and K.M. Bhurchandi, TMH, 2nd , 2006.
3. **8088 and 8086 Microprocessors - Programming, Interfacing, Software, Hardware & Applications** - Triebel and Avtar Singh, 4e, Pearson Education, 2003

MICROELECTRONICS CIRCUITS

Subject Code	: **10EC63**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT – 1

MOSFETS: Device Structure and Physical Operation, V-I Characteristics, MOSFET Circuits at DC, Biasing in MOS amplifier Circuits, Small Signal Operation and Models, MOSFET as an amplifier and as a switch, biasing in MOS amplifier circuits, small signal operation modes, single stage MOS

amplifiers. MOSFET internal capacitances and high frequency modes, Frequency response of CS amplifiers, CMOS digital logic inverter, detection type MOSFET.

UNIT -2

Single Stage IC Amplifier: IC Design philiosophy, CoUmparison of MOSFET and BJT, Current sources, Current mirrors and Current steering circuits, high frequency response.

UNIT – 3

Single Stage IC amplifiers (continued): CS and CF amplifiers with loads, high frequency response of CS and CF amplifiers, CG and CB amplifiers with active loads, high frequency response of CG and CB amplifiers, Cascade amplifiers. CS and CE amplifiers with source (emitter) degeneration source and emitter followers, some useful transfer parings, current mirrors with improved performance. SPICE examples.

UNIT – 4

Differences and Multistage Amplifiers: The MOS differential pair, small signal operation of MOS differential pair, the BJT differences pair, other non-ideal characteristics and differential pair, Differential amplifier with active loads, frequency response and differential amplifiers. Multistage amplifier. SPICE examples.

UNIT – 5

Feedback. General Feedback structure. Properties of negative feedback. Four basic feedback topologies. Series-Shunt feedback. Determining the loop gain. Stability problem. Effect of feedback an amplifier poles. Stability study using Bode plots. Frequency compensation. SPICE examples.

UNIT - 6

Operational Amplifiers: The two stage CMOS Op-amp, folded cascade CMOS op-amp, 741 op-amp circuit, DC analysis of the 741, small signal analysis of 741, gain, frequency response and slew rate of 741. Data Converters. A-D and D-A converters.

UNIT – 7 & 8

Digital CMOS circuits. Overview. Design and performance analysis of CMOS inverter. Logic Gate Circuits. Pass-transistor logic. Dynamic Logic Circuits. SPICE examples.

Text Book:

1. "Microelectronic Circuits", Adel Sedra and K.C. Smith, 5th Edition, Oxford University Press, 2004.

Reference Book:

1. "**Fundamentals of Microelectronics**" , Behzad Razavi, John Wiley, 2008

ANTENNAS AND PROPAGATION

Subject Code	: **10EC64**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

ANTENNA BASICS: Introduction, basic Antenna parameters, patterns, beam area, radiation intensity, beam efficiency, diversity and gain, antenna apertures, effective height, bandwidth, radiation, efficiency, antenna temperature and antenna filed zones.

UNIT - 2

POINT SOURCES AND ARRAYS: Introduction, point sources, power patterns, power theorem, radiation intensity, filed patterns, phase patterns. Array of two isotropic point sources, non-isotropic but similar point sources, principles of pattern multiplication, examples of pattern synthesis by pattern multiplication, non-isotropic point sources, broad side array with non uni polar amplitude distribution, broad side versus end fire array, direction of maxima fire arrays of n isotropic point sources of equal amplitude and spacing.

UNIT - 3

ELECTRIC DIPOLES AND THIN LINEAR ANTENNAS: Introduction, short electric dipole, fields of a short dipole, radiation resistance of short dipole, radiation resistances of lambda/2 Antenna, thin linear antenna, micro strip arrays, low side lobe arrays, long wire antenna, folded dipole antennas.

UNIT - 4 & 5

LOOP, SLOT, PATCH AND HORN ANTENNA: Introduction, small loop, comparison of far fields of small loop and short dipole, loop antenna general case, far field patterns of circular loop, radiation resistance, directivity, slot antenna, Balinet's principle and complementary antennas, impedance of complementary and slot antennas, patch antennas, horn antennas, rectangular horn antennas.

UNIT - 6

ANTENNA TYPES: Helical Antenna, Yagi-Uda array, corner reflectors, parabolic reflectors, log periodic antenna, lens antenna, antenna for special

applications – sleeve antenna, turnstile antenna, omni directional antennas, antennas for satellite antennas for ground penetrating radars, embedded antennas, ultra wide band antennas, plasma antenna.

UNIT - 7 & 8

RADIO WAVE PROPAGATION: Introduction, Ground wave propagation, free space propagation, ground reflection, surface wave, diffraction.

TROPOSPHERE WAVE PROPAGATION: Troposcopic scatter, Ionosphere propagation, electrical properties of the ionosphere, effects of earth's magnetic field.

TEXT BOOKS:

1. **Antennas and Wave Propagation**, John D. Krauss, 4th,McGraw-Hill International edition, 2010.
2. **Antennas and Wave Propagation** - Harish and Sachidananda: Oxford Press 2007

REFERENCE BOOKS:

1. **Antenna Theory Analysis and Design** - C A Balanis, 2nd ED, John Wiley, 1997
2. **Antennas and Propagation for Wireless Communication Systems** - Sineon R Saunders, John Wiley, 2003.
3. **Antennas and wave propagation -** G S N Raju: Pearson Education 2005

OPERATING SYSTEMS

Subject Code	: **10EC65**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

INTRODUCTION AND OVERVIEW OF OPERATING SYSTEMS: Operating system, Goals of an O.S, Operation of an O.S, Resource allocation and related functions, User interface related functions, Classes of operating systems, O.S and the computer system, Batch processing system, Multi programming systems, Time sharing systems, Real time operating systems, distributed operating systems.

UNIT - 2

STRUCTURE OF THE OPERATING SYSTEMS: Operation of an O.S, Structure of the supervisor, Configuring and installing of the supervisor,

Operating system with monolithic structure, layered design, Virtual machine operating systems, Kernel based operating systems, and Microkernel based operating systems.

UNIT - 3

PROCESS MANAGEMENT: Process concept, Programmer view of processes, OS view of processes, Interacting processes, Threads, Processes in UNIX, Threads in Solaris**.**

UNIT - 4

MEMORY MANAGEMENT: Memory allocation to programs, Memory allocation preliminaries, Contiguous and noncontiguous allocation to programs, Memory allocation for program controlled data, kernel memory allocation.

UNIT - 5

VIRTUAL MEMORY: Virtual memory basics, Virtual memory using paging, Demand paging, Page replacement, Page replacement policies, Memory allocation to programs, Page sharing, UNIX virtual memory.

UNIT - 6

FILE SYSTEMS: File system and IOCS, Files and directories, Overview of I/O organization, Fundamental file organizations, Interface between file system and IOCS, Allocation of disk space, Implementing file access, UNIX file system.

UNIT - 7

SCHEDULING: Fundamentals of scheduling, Long-term scheduling, Medium and short term scheduling, Real time scheduling, Process scheduling in UNIX.

UNIT - 8

MESSAGE PASSING: Implementing message passing, Mailboxes, Inter process communication in UNIX.

TEXT BOOK:

1. **"Operating Systems - A Concept based Approach"**, D. M. Dhamdhare, TMH, 2nd Ed, 2006.

REFERENCE BOOK:

1. **Operating Systems Concepts**, Silberschatz and Galvin, John Wiley, 5th Edition, 2001.
2. **Operating System – Internals and Design Systems**, Willaim Stalling, Pearson Education, 4th Ed, 2006.

ADVANCED COMMUNICATION LAB

Subject Code	: **10ECL67**	IA Marks	: 25
No. of Practical Hrs/Week: 03		Exam Hours	: 03
Total no. of Practical Hrs. : 42		Exam Marks	: 50

LIST OF EXPERIMENTS USING DESCERTE COMPONENTS and LABVIEW – 2009 can be used for verification and testing.

1. TDM of two band limited signals.
2. ASK and FSK generation and detection
3. PSK generation and detection
4. DPSK generation and detection
5. QPSK generation and detection
6. PCM generation and detection using a CODEC Chip
7. Measurement of losses in a given optical fiber (propagation loss, bending loss) and numerical aperture
8. Analog and Digital (with TDM) communication link using optical fiber.
9. Measurement of frequency, guide wavelength, power, VSWR and attenuation in a microwave test bench
10. Measurement of directivity and gain of antennas: Standard dipole (or printed dipole), microstrip patch antenna and Yagi antenna (printed).
11. Determination of coupling and isolation characteristics of a stripline (or microstrip) directional coupler
12. (a) Measurement of resonance characteristics of a microstrip ring resonator and determination of dielectric constant of the substrate. (b) Measurement of power division and isolation characteristics of a microstrip 3 dB power divider.

MICROPROCESSOR LAB

Subject Code	: **10ECL68**	IA Marks	: 25
No. of Practical Hrs/Week: 03		Exam Hours	: 03
Total no. of Practical Hrs. : 42		Exam Marks	: 50

I) **Programs involving**

1) Data transfer instructions like:
    i] Byte and word data transfer in different addressing modes.
    ii] Block move (with and without overlap)
    iii] Block interchange

2) Arithmetic & logical operations like:
    i] Addition and Subtraction of multi precision nos.
    ii] Multiplication and Division of signed and unsigned Hexadecimal nos.
    iii] ASCII adjustment instructions
    iv] Code conversions
    v] Arithmetic programs to find square cube, LCM, GCD, factorial

3) Bit manipulation instructions like checking:
    i] Whether given data is positive or negative
    ii] Whether given data is odd or even
    iii] Logical 1's and 0's in a given data
    iv] 2 out 5 code
    v] Bit wise and nibble wise palindrome

4) Branch/Loop instructions like:
    i] Arrays: addition/subtraction of N nos.
    Finding largest and smallest nos.
    Ascending and descending order
    ii] Near and Far Conditional and Unconditional jumps, Calls and Returns

5) Programs on String manipulation like string transfer, string reversing, searching for a string, etc.

6) Programs involving Software interrupts
    Programs to use DOS interrupt INT 21h Function calls for Reading a Character from keyboard, Buffered Keyboard input, Display of character/ String on console

II) Experiments on interfacing 8086 with the following interfacing modules through DIO (Digital Input/Output-PCI bus compatible) card
    a) Matrix keyboard interfacing
    b) Seven segment display interface
    c) Logical controller interface
    d) Stepper motor interface

III) Other Interfacing Programs

a) Interfacing a printer to an X86 microcomputer
b) PC to PC Communication

ELECTIVE – GROUP A

ANALOG AND MIXED MODE VLSI DESIGN

Subject Code	: **10EC661**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

(Text Book 1)

UNIT 1

Data converter fundamentals: Analog versus Digital Discrete Time Signals, Converting Analog Signals to Data Signals, Sample and Hold Characteristics, DAC Specifications, ADC Specifications, Mixed-Signal Layout Issues.

UNIT 2

Data Converters Architectures: DAC Architectures, Digital Input Code, Resistors String, R-2R Ladder Networks, Current Steering, Charge Scaling DACs, Cyclic DAC, Pipeline DAC, ADC Architectures, Flash, 2-Step Flash ADC, Pipeline ADC, Integrating ADC, Successive Approximation ADC.

UNIT 3

Non-Linear Analog Circuits: Basic CMOS Comparator Design (Excluding Characterization), Analog Multipliers, Multiplying Quad (Excluding Stimulation), Level Shifting (Excluding Input Level Shifting For Multiplier).

(Text Book 2)

UNIT 4:

Data Converter SNR: Improving SNR Using Averaging (Excluding Jitter & Averaging onwards), Decimating Filters for ADCs (Excluding Decimating without Averaging onwards), Interpolating Filters for DAC, Band pass and High pass Sync filters.

UNIT 5

Su-Microns CMOS circuit design: Process Flow, Capacitors and Resistors, MOSFET Switch (upto Bidirectional Switches), Delay and adder Elements, Analog Circuits MOSFET Biasing (upto MOSFET Transition Frequency).

UNIT 6
OPAmp Design (Excluding Circuits Noise onwards)

TEXT BOOK:

1. **Design, Layout, Stimulation ,**R. Jacob Baker, Harry W Li, David E Boyce, CMOS Circuit, PHI Education, 2005
2. **CMOS- Mixed Signal Circuit Design ,**R. Jacob Baker, (Vol II of CMOS: Circuit Design, Layout and Stimulation), IEEE Press and Wiley Interscience, 2002.

REFERENCE BOOKS:

1. **Design of Analog CMOS Integrated Circuits**, B Razavi, First Edition, McGraw Hill,2001.

CMOS Analog Circuit Design, P e Allen and D R Holberg, Second Edition, Oxford University Press,2002.

SATELLITE COMMUNICATION

Subject Code	: **10EC662**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1
OVER VIEW OF SATELLITE SYSTEMS: Introduction, frequency allocation, INTEL Sat.

UNIT - 2
ORBITS: Introduction, Kepler laws, definitions, orbital element, apogee and perigee heights, orbit perturbations, inclined orbits, calendars, universal time, sidereal time, orbital plane, local mean time and sun synchronous orbits, Geostationary orbit: Introduction, antenna, look angles, polar mix antenna,

limits of visibility, earth eclipse of satellite, sun transit outage, leandiag orbits.

UNIT - 3

PROPAGATION IMPAIRMENTS AND SPACE LINK: Introduction, atmospheric loss, ionospheric effects, rain attenuation, other impairments.

SPACE LINK: Introduction, EIRP, transmission losses, link power budget, system noise, CNR, uplink, down link, effects of rain, combined CNR.

UNIT - 4

SPACE SEGMENT: Introduction, power supply units, altitude control, station keeping, thermal control, TT&C, transponders, antenna subsystem.

UNIT - 5 & 6

EARTH SEGEMENT: Introduction, receive only home TV system, out door unit, indoor unit, MATV, CATV, Tx – Rx earth station.

INTERFERENCE AND SATELLITE ACCESS: Introduction, interference between satellite circuits, satellite access, single access, pre-assigned FDMA, SCPC (spade system), TDMA, pre-assigned TDMA, demand assigned TDMA, down link analysis, comparison of uplink power requirements for TDMA & FDMA, on board signal processing satellite switched TDMA.

UNIT - 7 & 8

DBS, SATELLITE MOBILE AND SPECIALIZED SERVICES: Introduction, orbital spacing, power ratio, frequency and polarization, transponder capacity, bit rates for digital TV, satellite mobile services, USAT, RadarSat, GPS, orb communication and iridium.

TEXT BOOK:

1. **Satellite Communications**, Dennis Roddy, 4th Edition, McGraw-Hill International edition, 2006.

REFERENCES BOOKS:

1. **Satellite Communications**, Timothy Pratt, Charles Bostian and Jeremy Allnutt, 2nd Edition, John Wiley & Sons, 2003.
2. **Satellite Communication Systems Engineering**, W. L. Pitchand, H. L. Suyderhoud, R. A. Nelson, 2nd Ed., Pearson Education., 2007.

RANDOM PROCESSES

Subject Code	: **10EC663**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

INTRODUCTION TO PROBABILITY THEORY: Experiments, sample space, Events, Axioms, Assigning probabilities, Joint and conditional probabilities, Baye's Theorem, Independence, Discrete Random Variables, Engg Example.

UNIT - 2

Random Variables, Distributions, Density Functions: CDF, PDF, Gaussian random variable, Uniform Exponential, Laplace, Gamma, Erlang, Chi-Square, Raleigh, Rician and Cauchy types of random variables

UNIT - 3

OPERATIONS ON A SINGLE R V: Expected value, EV of Random variables, EV of functions of Random variables, Central Moments, Conditional expected values.

UNIT - 4

Characteristic functions, Probability generating functions, Moment generating functions, Engg applications, Scalar quantization, entropy and source coding.

UNIT - 5

Pairs of Random variables, Joint CDF, joint PDF, Joint probability mass functions, Conditional Distribution, density and mass functions, EV involving pairs of Random variables, Independent Random variables, Complex Random variables, Engg Application.

UNIT - 6

MULTIPLE RANDOM VARIABLES: Joint and conditional PMF, CDF, PDF,.EV involving multiple Random variables, Gaussian Random variable in multiple dimension, Engg application, linear prediction.

UNIT - 7

RANDOM PROCESS: Definition and characterization, Mathematical tools for studying Random Processes, Stationary and Ergodic Random processes, Properties of ACF.

UNIT - 8

EXAMPLE PROCESSES: Markov processes, Gaussian Processes, Poisson Processes, Engg application, Computer networks, Telephone networks.

TEXT BOOK:

1. **Probability and random processes: application to Signal processing and communication** - S L Miller and D C Childers**:** Academic Press / Elsivier 2004

REFERENCE BOOKS:

1. **Probability, Random variables and stochastic processes** - A. Papoullis and S U Pillai: McGraw Hill 2002
2. **Probability, Random variables and Random signal principles** - Peyton Z Peebles**:** TMH 4th Edition 2007
3. **Probability, random processes and applications** - H Stark and Woods**:** PHI 2001

LOW POWER VLSI DESIGN

Subject Code	: **10EC664**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT – 1

Introduction, Sources of power dissipation, designing for low power. Physics of power dissipation in MOSFET devices – MIS Structure, Long channel and sub-micron MOSFET, Gate induced Drain leakage.

UNIT - 2

Power dissipation in CMOS – Short circuit dissipation, dynamic dissipation, Load capacitance. Low power design limits - Principles of low power design, Hierarchy of limits, fundamental limits, Material, device, circuit and system limits.

UNIT – 3&4

SYNTHESIS FOR LOW POWER: Behavioral, Logic and Circuit level approaches, Algorithm level transforms, Power-constrained Least squares optimization for adaptive and non-adaptive filters, Circuit activity driven architectural transformations, voltage scaling, operation reduction and substitution, pre- computation, FSM and Combinational logic, Transistor sizing.

UNIT – 5&6

DESIGN AND TEST OF LOW-VOLTAGE CMOS CIRCUITS: Introduction, Design style, Leakage current in Deep sub-micron transistors, device design issues, minimizing short channel effect, Low voltage design techniques using reverse V_{gs}, steep sub threshold swing and multiple threshold voltages, Testing with elevated intrinsic leakage, multiple supply voltages.

UNIT - 7

LOW ENERGY COMPUTING: Energy dissipation in transistor channel, Energy recovery circuit design, designs with reversible and partially reversible logic, energy recovery in adiabatic logic and SRAM core, Design of peripheral circuits – address decoder, level shifter and I/O Buffer, supply clock generation.

UNIT - 8

SOFTWARE DESIGN FOR LOW POWER: Introduction, sources of power dissipation, power estimation and optimization.

TEXT BOOK:

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

DATA STRUCTURE USING C++

Subject Code	: **10EC665**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

INTRODUCTION: Functions and parameters, Dynamic memory allocation classis, Testing and debugging. Data Representation, Introduction, Linear lists, Formula-based representation linked representation, Indirect addressing simulating pointers.

UNIT - 2

ARRAYS AND MATRICS: Arrays, Matrices, Special matrices spare matrices.

UNIT - 3

STACKS: The abstract data types, Derived classed and inheritance, Formula-based representation, Linked representation, Applications.

UNIT - 4

Queues: The abstract data types, Derived classes and inheritance, Formula-based representation, Linked Linked representation, Applications.

UNIT - 5

SKIP LISTS AND HASHING: Dictionaries, Linear representation, Skip list presentation, Hash table representation.

UNIT - 6

BINARY AND OTHER TREES: Trees, Binary trees, Properties and representation of binary trees, Common binary tree operations, Binary tree traversal the ADT binary tree, ADT and class extensions.

UNIT - 7

PRIRITY QUEUES: Linear lists, Heaps, Leftist trees.

UNIT-8

Search Trees: Binary search trees, B-trees, Applications.

TEXT BOOK:

1. **Data structures, Algorithms, and applications in C++ -** Sartaj Sahni, McGraw Hill.2000.

REFERENCE BOOKS:

1. **Object Oriented Programming in C++** - Balaguruswamy. TMH, 1995.
2. **Programming in C++** - Balaguruswamy. TMH, 4th, 2010 .

DIGITAL SYSTEMS DESIGN USING VHDL

Subject Code	: **10EC666**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT - 1

INTRODUCTION: VHDL description of combinational networks, Modeling flip-flops using VHDL, VHDL models for a multiplexer,

Compilation and simulation of VHDL code, Modeling a sequential machine, Variables, Signals and constants, Arrays, VHDL operators, VHDL functions, VHDL procedures, Packages and libraries, VHDL model for a counter.

UNIT - 2

DESIGNING WITH PROGRAMMABLE LOGIC DEVICES: Read-only memories, Programmable logic arrays (PLAs), Programmable array logic (PLAs), Other sequential programmable logic devices (PLDs), Design of a keypad scanner.

UNIT - 3

DESIGN OF NETWORKS FOR ARITHMETIC OPERATIONS: Design of a serial adder with accumulator, State graphs for control networks, Design of a binary multiplier, Multiplication of signed binary numbers, Design of a binary divider.

UNIT - 4

DIGITAL DESIGN WITH SM CHARTS: State machine charts, Derivation of SM charts, Realization of SM charts. Implementation of the dice game, Alternative realization for SM charts using microprogramming, Linked state machines.

UNIT - 5

DESIGNING WITH PROGRAMMABLE GATE ARRAYS AND COMPLEX PROGRAMMABLE LOGIC DEVICES: Xlinx 3000 series FPGAs, Designing with FPGAs, Xlinx 4000 series FPGAs, using a one-hot state assignment, Altera complex programmable logic devices (CPLDs), Altera FELX 10K series COLDs.

UNIT - 6

FLOATING - POINT ARITHMETIC: Representation of floating-point numbers, Floating-point multiplication, Other floating-point operations.

UNIT - 7

ADDITIONAL TOPICS IN VHDL: Attributes, Transport and Inertial delays, Operator overloading, Multi-valued logic and signal resolution, IEEE-1164 standard logic, Generics, Generate statements, Synthesis of VHDL code, Synthesis examples, Files and Text IO.

UNIT - 8

VHDL MODELS FOR MEMORIES AND BUSES: Static RAM, A simplified 486 bus model, Interfacing memory to a microprocessor bus.

TEXT BOOK:

1. **Digital Systems Design using VHDL**, Charles H. Roth. Jr:, Thomson Learning, Inc, 9th reprint, 2006.

REFERENCE BOOKS:

1. **Fundamentals of Digital Logic Design with VHDL**, Stephen Brwon & Zvonko Vranesic, Tata McGrw-Hill, New Delhi, 2nd Ed., 2007
2. **Digital System Design with VHDL**, Mark Zwolinski, 2 Ed, Pearson Education., 2004
3. **Digital Electronics and Design with VHDL** - Volnei A Pedroni, Elsivier Science, 2009.

VIRTUAL INSTRUMENTATION

Subject Code	: **10EC668**	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

UNIT 1

Review of Digital Instrumentation: Representation of analog signals in the digital domain – Review of quantization in amplifier and time areas, sample and hold, sampling theorem, ADC and DAC.

UNIT 2

Fundamentals of Virtual Instrumentation: Concept of Virtual Instrumentation – PC based data acquisition – Typical on board DAQ card – Resolution and sampling frequency – Multiplexing of analog inputs – Single-ended and differential inputs – Different strategies for sampling of multi channel analog inputs. Concept of universal DAQ card – Use of timer-counter and analog outputs on the universal DAQ card.

UNIT 3

Cluster of Instruments in System: Interfacing of external instruments to a PC – RS 232C, RS – 422, RS 485 and USB standards – IEEE 488 standard – ISO –OSI model for series bus – introduction to bus protocols of MOD bus and CAN bus.

UNIT 4

Graphical Programming Environment in VI: Concepts of graphical programming – Lab-view software – Concept of VIs and sub VIs – Display types – Digital – Analog – Chart – Oscilloscope types – Loops – Case and sequence structures – Types of data – Arrays – Formulate nodes – Local and Global variables – String and file I/O.

UNIT 5

Analysis Tools and Simple Application in VI: Fourier transform – Power spectrum – Correlation – Windowing and filtering tools – Simple temperature indicator – ON/OFF controller – PID controller – CRO emulation – Simulation of a simple second order system – Generation of HTML page.

Reference Books:

1. S. Gupta and J P Gupta,"**PC Interfacing for Data Acquisition and Process Control"**, Instrument Society of America, 1994
2. Peter W Gofton , "**Understanding Serial Communication**", Sybes International, 2000
3. Robert H. Bishop, "**Learning with Lab-View**" Preticee Hall, 2009
4. Sanjay Gupta, "**Virtual Instrumentation, LABVIEW"**, TMH, New Delhi, 2003
5. Ernest O. Doeblin and Dhanesh N Manik, " **Measrement Systems – Application and Design"**, 5th Edn, TMH, 2007.