IV YEAR I SEMESTER COURSE STRUCTURE

Code	Subject	L	T/P/D	C
57034	Management Science	3	1	3
57035	VLSI Design	4	-	4
57036	Microwave Engineering	3	1	3
57037	Computer Networks	4	1	4
	ELECTIVE–I	3	1	3
57038	EMI/EMC			
57039	DSP Processors & Architectures			
57040	Telecommunication Switching Systems			
57041	Digital Image Processing			
	ELECTIVE–II	4	1	4
57042	Optical Communications			
57043	Embedded Systems			
57044	Television Engineering			
57045	Multimedia and Signal coding			
57607	e-CAD & VLSI Lab.	-	3	2
57608	Microwave Engg. & Digital Commns. Lab.	-	3	2
	Total	**21**	**11**	**25**

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IV Year B.Tech. ECE - I Sem	L	T/P/D	C
	3	1/-/-	3

(57034) MANAGEMENT SCIENCE

Unit I

Introduction to Management: Entrepreneurship and organization - Nature and Importance of Management, Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

Unit II

Designing Organisational Structures: Departmentation and Decentralisation, Types of Organisation structures - Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure and their merits, demerits and suitability.

Unit III

Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement-Statistical Quality Control: $\overline{X}$ chart, R chart, c chart, p chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.

Unit IV

A) Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records - Supply Chain Management

B) Marketing: Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle., Channels of distribution.

Unit V

Human Resources Management (HRM): Evolution of HRM, Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary

Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

Unit VI

Project Management (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

Unit VII

Strategic Management: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

Unit VIII

Contemporary Management Practices: Basic concepts of Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levels, Value Chain Analysis,Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering 5S Model, Deming's PDCA, Kaizen, Poka-Yoke, Muda, Benchmarking, Balanced Score Card.

TEXT BOOK:

1. Aryasri: Management Science, TMH, New Delhi, 2009

REFERENCE BOOKS:

1. Stoner, Management, Pearson, 2009
2. Kotler Philip & Keller Kevin Lane: Marketing Management PHI, 2009.
3. Koontz, Weihrich, & Aryasri: Principles of Management, TMH, 2009.
4. Thomas N.Duening & John M.Ivancevich Management—Principles and Guidelines, Cengage, 2009.
5. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2009.
6. Memoria & S.V.Ganker, Personnel Management, Himalaya, 2009
7. Schermerhorn: Management, Wiley, 2009.
8. Parnell: Strategic Management, Biztantra, 2009.

9. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2009.
10. William J. Stevenson & Ceyhun Ozgur: Introduction to Management Science, TMH, 2007.

Pre-requisites: Managerial Economics

Objective: To familiarize with the process of management and to provide basic insights into select contemporary management practices.

Codes/Tables: Normal Distribution Function Table need to be permitted into the examination Hall.

Question Paper Pattern: 5 Questions to be answered out of 8 questions. The question paper should contain atleast 2 practical problems, one each from units –III & VI

Each question should not have more than 3 bits.

Unit VIII will have only short questions, not essay questions.

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IV Year B.Tech. ECE - I Sem	L	T/P/D	C
	4	-/-/-	4

(57035) VLSI DESIGN

Unit I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS

Technologies; Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Probe testing, Integrated Resistors and Capacitors, CMOS Nanotechnology

Unit II

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

Unit III

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

Unit IV

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

Unit V:

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Unit VI:

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories, Content Addressable Memory.

Unit VII:

Semiconductor Integrated Circuit Design: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing

low power design.

Unit VIII

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, System-level Test Techniques, Layout Design for improved Testability.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition
2. VLSI Desing- K .Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
3. CMOS VLSI Design – A circuits and systems perspective, Neil H. E Weste, David Harris, Ayan Banerjee, pearson, 2009.

References:

1. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. VLSI Design – A.Albert Raj, Latha, PHI, 2008
4. Introduction to VLSI – Mead & Convey, BS Publications, 2010
5. VLSI Design – M. Micheal Vai, CRC Press, 2009.

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IV Year B.Tech. ECE - I Sem	L	T/P/D	C
	3	1/-/-	3

(57036) MICROWAVE ENGINEERING

Unit I

Microwave Transmission Lines - I: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides – Solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations, Illustrative Problems.

UNIT II

Microwave Transmission Lines – II: Rectangular Guides - Power Transmission and Power Losses, Impossibility of TEM Mode, Micro strip Lines– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor Cavity Resonators– Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients. Illustrative Problems

Unit III

Waveguide Components And Applications - I: Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide Windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Diferent Types, Resistive Card and Rotary Vane Attenuators; Waveguide Phase Shifters – Types, Dielectric and Rotary Vane Phase Shifters, Waveguide Multiport Junctions – E plane and H plane Tees, Magic Tee. Directional Couplers – 2 Hole, Bethe Hole types. Illustrative Problems.

Unit IV

Waveguide Components And Applications - II: Ferrites– Composition and Characteristics, Faraday Rotation; Ferrite Components – Gyrator, Isolator, Circulator. Scattering Matrix– Significance, Formulation and Properties, S Matrix Calculations for – 2 port Junctions, E plane and H plane Tees, Magic Tee, Circulator and Isolator. Illustrative Problems.

Unit V

Microwave Tubes – I: Limitations and Losses of conventional tubes at microwave frequencies. Microwave tubes – O type and M type classifications. O-type tubes : 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and o/p Characteristics, Effect of Repeller Voltage on Power O/p. Illustrative Problems.

Unit VI

Helix TWTs: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.

M-Type Tubes

Introduction, Cross-field effects, Magnetrons – Different Types, Cylindrical Traveling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics. Illustrative Problems.

Unit VII

Microwave Solid State Devices: Introduction, Classification, Applications. TEDs – Introduction, Gunn Diodes – Principle, RWH Theory, Characteristics, Basic Modes of Operation - Gunn Oscillation Modes, LSA Mode, Introduction to Avalanche Transit Time Devices.

Unit VIII

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions; Microwave Power Measurement – Bolometers. Measurement of Attenuation, Frequency Standing Wave Measurements – Measurement of Low and High VSWR, Cavity Q. Impedance Measurements

Text Books:

1. Microwave Devices and Circuits – Samuel Y. Liao, Pearson, 3rd Edition,2003.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.

References:

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.
5. Microwave Engineering – A. Das and S.K. Das, TMH, 2nd ed., 2009.

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IV Year B.Tech. ECE- I Sem	L	T/P/D	C
	4	1/-/-	4

(57037) COMPUTER NETWORKS

UNIT I

Introduction to networks, internet, protocols and standards, the OSI model, layers in OSI model, TCP/IP suite, Addressing, Analog and digital signals.

UNIT II

Physical Layer: digital transmission, multiplexing, transmission media, circuit switched networks, Datagram networks, virtual circuit networks, switch and Telephone network.

UNIT III

Data link layer: Introduction, Block coding, cyclic codes, checksum, framing, flow and error control, Noiseless channels, noisy channels, HDLC, point to point protocols

UNIT IV

Medium Access sub layer: Random access, controlled access, channelization, IEEE standards, Ethernet, Fast Ethernet, Giga-Bit Ethernet, wireless LANs.

UNIT V

Connecting LANs, backbone networks and virtual LANs, Wireless WANs, SONET, frame relay and ATM.

UNIT VI

Network Layer: Logical addressing, internetworking, tunneling, address mapping, ICMP, IGMP, forwarding, uni-cast routing protocols, multicast routing protocols.

UNIT VII

Transport Layer: Process to process delivery, UDP and TCP protocols, SCTP, data traffic, congestion, congestion control, QoS, integrated services, differentiated services, QoS in switched networks.

UNIT VIII

Application Layer – Domain name space, DNS in internet, electronic mail, FTP, WWW, HTTP, SNMP, multi-media, network security

TEXT BOOKS:

1. Data Communications and Networking – Behrouz A. Forouzan, Fourth Edition TMH,2006.
2. Computer Networks — Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S.Keshav,2nd Edition,Pearson Education
2. Understanding communications and Networks,3rd Edition, W.A.Shay,Cengage Learning.
3. Computer and Communication Networks ,Nader F. Mir, Pearson Education
4. Computer Networking:A Top-Down Approach Featuring the Internet, James F.Kurose,K.W.Ross,3rd Edition,Pearson Education.
5. Data and Computer Communications,G.S.Hura and M.Singhal,CRC Press,Taylor and Francis Group.
6. Data communications and computer Networks,P.C.Gupta,PHI.

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IV Year B.Tech. ECE - I Sem	L	T/P/D	C
	3	1/-/-	3

(57038) ELECTRO MAGNETIC INTERFERNCE AND ELECTROMAGNETIC COMPATIBILITY (ELECTIVE-I)

Unit – I: Sources of EMI

Definition of EMI and EMC, Classification, Natural and man-made EMI sources, Switching transients, Electrostatic Discharge, Nuclear Electromagnetic Pulse and High Power Electromagnetics.

Unit – II: EMI Coupling Modes

Penetration – Introduction. Shielding theory - shielding effectiveness, the circuit approach, the wave approach, Aperture theory, Calculation of effectiveness of a conducting box with an aperture. Introduction to propagation and cross talk – Introduction, Basic principles, Determination of EM Field from Transmission Lines.

Unit – III: EMI controlling techniques-1

Grounding - Principles and Practice of Earthing, Precautions in Earthing, Measurements of ground resistance, System grounding for EMC, Cable shielding Grounding.

Shielding – Theory and Effectiveness, Materials, Integrity at discontinuities, Conductive coatings, Cable shielding, Effectiveness measurements. Electrical Bonding.

Unit – IV: EMI controlling techniques-2

Characteristics and Types of Filters – Impedance Mismatch, Lumped element Low-Pass, High- Pass, Band-Pass and Band-Reject filters. Power Line filter Design - Common mode, Differential mode, Combined CM and DM filters, Design Example.

EMC Gaskets – Knitted Wire-Mesh Gaskets, Wire-Screen Gaskets, Oriented Wire mesh, Conductive Elastomer, Transparent Conductive windows, Conductive Adhesive, Conductive Grease, Conductive Coatings, Isolation transformers, Opto-Isolators.

Unit – V: EMI Measurements-1

Introduction to open area test site measurements – Measurement precautions

– open area test site – Terrain Roughness – NSA – Measurement of test site imperfections – Antenna factor measurement – Measurement errors.

Unit – VI: EMI Measurements-2

Radiated Interference measurements – Anechoic chamber – TEM cell – Reverberating chamber – GHz TEM cell – Comparison of test facilities – Measurement uncertainties

Unit – VII : EMI Measurements-3

Conducted Interference measurements – Characterisation – Conducted EM noise on power supply lines – Conducted EMI from equipment – Immunity – Detectors and measurement – Pulsed EMI immunity – Electrostatic Discharge

Unit – VIII : EMI/EMC Standards

Introduction – Standards for EMI/EMC – MIL –STD 461/462 – IEEE/ANSI Standards – CISPR/IEC Standards – FCC regulations.

TEXT BOOKS:

1. Engineering Electromagnetic Compatibility – V.Prasad Kodali – 2/e – IEEE Press – Wiley India Pvt. Ltd – 2001.
2. Principles and Techniques of Electromagnetic Compatibility – Christos Christopoulos – 2/e – CRC Press (Taylor & Francis Group) – 2007

REFERENCES:

1. Introduction to Electromagnetic Compatibility – Clayton R.Paul – John Wiley & Sons, 1992.
2. Electromagnetic Compatibility of Integrated Circuits – Techniques for low emission and susceptibility – Edited by Sonia Ben Dhia, Mohamed Ramdani and Etienne Sicard – Springer. 2006.
3. EMI reduction in Electronic Systems – Mills – J.P – Prentice Hall Inc.
4. Noise Reduction in Electronic Systems – Henry W.Ott, 2nd Edition, Wiley Interscience, 1988.

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IV Year B.Tech. ECE I-Sem	L	T/P/D	C
	3	1/-/-	3

(57039) DSP PROCESSORS AND ARCHITECTURES (ELECTIVE – I)

UNIT I : INTORODUCTION TO DIGITAL SIGNAL PROCESING :
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 MATLAB, DSP using MATLAB.

UNIT II : COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS:
Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT III : ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES :
Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT IV : EXECUTION CONTROL AND PIPELINING :
Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT V : PROGRAMMABLE DIGITAL SIGNAL PROCESSORS :
Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT VI : IMPLEMENTATIONS OF BASIC DSP ALGORITHMS :
The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

UNIT VII : IMPLEMENTATION OF FFT ALGORITHMS :
An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT VIII : INTERFACING MEMORY AND I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES :
Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS :

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.

REFERENCES :

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkata Ramani and M. Bhaskar, TMH, 2004.
2. Digital Signal Processing – Jonatham Stein, John Wiley, 2005.

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IV Year B.Tech. ECE - I Sem	L	T/P/D	C
	3	1/-/-	3

(57040) TELECOMMUNICATION SWITCHING SYSTEMS (ELECTIVE-I)

Unit I

Switching Systems: Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Strowger Switching Components; Step by Step Switching; Design Parameters; 100 Line Switching System; 1000 Line Blocking Exchange; 10,000 Line Exchange; Crossbar Switching-Principle of Crossbar Switching; Crossbar Switch Configurations; Cross-point Technology; Crossbar Exchange Organization; A General Trunking; Electronic Switching; Reed Electronic Systems; Digital Switching Systems.

Unit II

Telecommunications Traffic: Introduction; The Unit of Traffic; Congestion; Traffic Measurement; A Mathematical Model; Lost-Call Systems-Theory; Traffic Performance; Loss Systems in Tandem; Use of Traffic Tables; Queuing Systems-The Second Erlang Distribution; Probability of Delay; Finite Queue Capacity; Some Other Useful Results; Systems with a Single Server; Queues in Tandem; Delay Tables; Applications of Delay Formulae.

Unit III

Switching Networks: Introduction; Single Stage Networks; Gradings-Principle; Design of Progressive Gradings; Other Forms of Grading; Traffic Capacity of Gradings; Application of Gradings; Link Systems-General, Two Stage Networks; Three Stage Networks; Four Stage Networks; Discussion; Grades of Service of Link Systems.

Unit IV

Time Division Switching: Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching.

Unit V

Control of Switching Systems: Introduction; Call Processing Functions-

Sequence of Operations; Signal Exchanges; State Transition Diagrams; Common Control; Reliability; Availability and Security; Stored Program Control.

Unit VI

Signalling: Introduction; Customer Line Signaling; Audio Frequency Junctions and Trunk Circuits; FDM Carrier Systems-Outband Signaling; Inband (VF) Signaling; PCM Signaling; Inter Register Signaling; Common Channel Signaling Principles-General Signaling Networks; CCITT Signaling System Number 6; CCITT Signaling System Number 7; The High Level Data Link Control Protocol; Signal Units; The Signaling Information Field.

Unit VII

Packet Switching: Introduction; Statistical Multiplexing; Local Area and Wide Area Networks-Bus Networks; Ring Networks; Comparison of Bus and Ring Networks; Optical Fiber Networks; Large Scale Networks-General; Datagrams and Virtual Circuits; Routing; Flow Control; Standards; Frame Relay; Broadband Networks-General; The Asynchronous Transfer Mode; ATM Switches.

Unit VIII

Networks: Introduction; Analog Networks; Integrated digital Networks; Integrated Services Digital Networks; Cellular Radio Networks; Intelligent Networks; Private Networks; Charging; Routing – General, Automatic Alternative Routing.

Text Books:

1. J. E Flood, "Telecommunications Switching and Traffic Networks," Pearson Education, 2006.
2. Tyagarajan Viswanathan, "Telecommunications Switching Systems and Networks," Prentice Hall of India Pvt. Ltd., 2006.

Reference Book:

1. John C Bellamy, "Digital Telephony," John Wiley International Student Edition,3rd Edition, 2000.
2. Behrouz A. Forouzan, " Data Communications and Networking," TMH, 2nd Edition, 2002.
3. Tomasi," Introduonction to Data Communication and Networking," Pearson Education, 1st Edition, 2007.

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IV Year B.Tech. ECE - I Sem	L	T/P/D	C
	3	1/-/-	3

(57041) DIGITAL IMAGE PROCESSING (ELECTIVE – I)

Unit I

Digital Image Fundamentals & Image Transforms: Digital Image fundamentals, Sampling and quantization, Relation ship between pixels, Image Transforms: 2-D FFT, Properties, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Haar transform, Slant transform, Hotelling transform.

Unit II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in spatial domain, enhancement through point operation, types of point operation, histogram manipulation, linear and non – linear gray level transformation, local or neighborhood operation, median filter, spatial domain high-pass filtering.

Unit III

Image Enhancement (Frequency Domain): Filtering in frequency domain, obtaining frequency domain filters from spatial filters, Generating filters directly in the frequency domain, Low pass (smoothing) and High pass (sharpening) Filters in Frequency Domain.

Unit IV

Image Restoration: Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration, Interactive Restoration.

Unit V

Image segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.

Unit VI

Image Compression: Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression, JPEG 2000 Standards.

Unit VII

Wavelet based Image processing: Introduction to Wavelet Transform, Continuous Wavelet Transform, Discrete Wavelet Transform, Filter banks, Wavelet based image compression, Wavelet based denoising and wavelet thresholding methods.

Unit VIII:

Morphological Image processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, The Strel function, Erosion. Combining Dilation and Erosion: Opening and closing, the hit or miss Transformation, Overview of Digital Image Watermarking Methods.

TEXT BOOKS:

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3rd edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010

REFERENCES:

1. Digital Image Processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
2. Fundamentals of Digital Image Processing – A.K.Jain , PHI, 1989
3. Digital Image processing and Computer vision – Somka, Hlavac, Boyle- Cengage learning (Indian edition) 2008.
4. Introductory Computer vision Imaging Techniques and Solutions- Adrian low, 2008, 2nd Edition
5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC Press, 2010.

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IV Year B.Tech. ECE - I Sem	L	T/P/D	C
	4	1/-/-	4

(57042) OPTICAL COMMUNICATIONS (ELECTIVE-II)

Unit I

Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications, Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, Vnumber, Mode coupling, Step Index fibers, Graded Index fibers.

Unit II

Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Fiber materials Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.

Unit III

Information capacity determination, Group delay, Types of Dispersion - Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening, Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss.

Unit IV

Fiber Splicing- Splicing techniques, splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints,. Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product, Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies. Reliability of LED&ILD

Unit V

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling

Unit VI

Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

Unit VII

Optical system design — Considerations, Component choice, Multiplexing, Point-to- point links, System considerations, Link power budget with examples, Overall fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples

Unit VIII

Transmission distance, Line coding in Optical links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, TMH, 4th Edition, 2008.
2. Optical Fiber Communications – John M. Senior, Pearson Education, 3rd Edition, 2009.

REFERENCES:

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Introduction to Fiber Optics by Donald J.Sterling Jr. – Cengage learning, 2004.
5. Optical Communication Systems – John Gowar, 2nd edition, PHI, 2001.

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IV Year B.Tech. ECE - I Sem	L	T/P/D	C
	4	1/-/-	4

(57043) EMBEDDED SYSTEMS
(ELECTIVE – II)

UNIT – I

Embedded Computing : Introduction, Complex Systems and Microprocessor, Embedded System Design Process, Formalisms for System Design, Design Examples. (Chapter I from Text Book 1, Wolf)

UNIT – II

8051 Architecture : Introduction, 8051 Microcontroller Hardware, Timers and Counters, I/O Ports and Circuits, Serial Data Communication, External Memory, Interrupts (Chapter 3 from Text Book 2, Ayala and Gadre)

UNIT – III

8051 Programming : Assembly Language Programming Process, 8051 Instruction Set : Data Transfer, Arithmetic, Logical and Branch Instructions, Decimal Arithmetic, Interrupt Programming (Chapters 4 – 8 from Text Book 2, Ayala and Gadre)

UNIT – IV

PSoC Architecture and Programming : PSoC as a Single-Chip Solution for Embedded System Design, Analog, Digital and Controller (8051) Blocks in PSoC, Hardware Programming through PSoC Creator, I/O Pin Configurability (Text Book 3, Robert Ashby)

UNIT – V

Applications : Blinking an LED, Cap Sense, Digital Logic, Precision Analog and Serial Communications (Text Book 4, Robert Ashby)

Unit - VII

Basic Design Using a Real-Time Operating System : Principles, Semaphores and Queues, HardReal-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded

Software, Getting Embedded Software into the Target System; Debugging

Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System. (Chapter 8,9,10 & 11 from Text Book 3, Simon).

Unit - VIII

Introduction to advanced architectures : ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.
(Chapter 8 from Text Book 1, Wolf).

TEXT BOOKS :

1. 'Computers as Components – Principles of Embedded Computing System Design', Wayne Wolf, Elsevier (2nd Edition)
2. 'The 8051 Microcontroller', Kenneth Ayala and Dhanunjay Gadre, Thomson
3. 'The PSoC Controller' (Paper Back Edition), Robert Ashby, Newens
4. 'My First Five PSoC Designs', Robert Ashby, e-Book

REFERENCES :

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education.

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IV Year B.Tech. ECE - I Sem	L	T/P/D	C
	4	1/-/-	4

(57044) TELEVISION ENGINEERING (ELECTIVE-II)

Unit I

Introduction: TV transmitter and receivers, synchronization. Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution, Composite video signal, TV standards. Camera tubes: image Orthicon, Plumbicon, vidicon, silicon Diode Array vidicon, Comparison of camera tubes, Monochrome TV camera,

Unit II

TV Signal Transmission and Propagation: Picture Signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW,TV transmitter, TV signal propagation, interference, TV broadcast channels, TV transmission Antennas.

Unit III

Monochrome TV Receiver: RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits, AGC, noise cancellation, video and inter carrier sound signal detection, vision IF subsystem of Black and White receivers, Receiver sound system: FM detection, FM Sound detectors, and typical applications.

Unit-IV

Sync Separation and Detection: TV Receiver Tuners, Tuner operation, VHF and UHF tuners, digital tuning techniques, remote control of receiver functions. Sync Separation, AFC and Deflection Oscillators: Synchronous separation, k noise in sync pulses, separation of frame and line sync pulses. AFC, single ended AFC circuit, Deflection Oscillators, deflection drive ICs, Receiver Antennas, Picture Tubes,

Unit V

Color Television : Colour signal generation, additive colour mixing, video signals for colours, colour difference signals, encoding, Perception of brightness and colours luminance signal, Encoding of colour difference signals, formation of chrominance signals, color cameras, Colour picture

tubes, colour specifications,

Unit VI

Color Signal Encoding and Decoding: NTSC colour system PAL colour system, PAL encoder, PAL-D Decoder, chrome signal amplifiers, separation of U and V signals, colour burst separation, Burst phase discriminator, ACC amplifier, Reference oscillator, Indent and colour killer circuits, U& V demodulators, colour signal mixing.

Unit –VII

Color Receiver: introduction to colour receiver, Electron tuners, IF subsystem, Y-signal channel, Chroma decoder. Separation of U & V Color, Phasors, synchronous demodulators, Sub carrier generation, raster circuits.

Unit VIII

Introduction to Digital TV, Digital Satellite TV, Direct to Home Satellite TV, Digital TV Transmitter, Digital TV Receiver, Digital Terrestrial TV, LCD TV, LED TV, CCD Image Sensors, HDTV.

Test Books:

1. Television and Video Engineering- A.M.Dhake, 2nd Edition.
2 Modern Television Practice – Principles, Technology and Service- R.R. Gallatin, New Age International Publication, 2002.
3 Monochrome and Colour TV- R.R. Gulati, New Age International Publication, 2002.

References:

1. Colour Television Theory and Practice-S.P.Bali, TMH, 1994.
2. Basic Television and Video Systems-B.Grob and C.E.Herndon, McGraw Hill, 1999.

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(57045) MULTIMEDIA AND SIGNAL CODING (ELECTIVE-II)

Unit I:

Introduction to Multimedia: Multimedia, World Wide Web, Overview of multimedia tools, Multimedia authoring, Graphics/ image data types, and file formats.

Unit II:

Color in Image and Video: Color Science – Image Formation, Camera Systems, Gamma Correction, Color Matching Functions, CIE Chromaticity Diagram, Color Monitor Specifications, Out-of-Gamut colors, White point correction, XYZ to RGB transform, Transform with Gamma Correction, L*a*b* Color model.

Color models in images – RGB color model for CRT displays, Subtractive Color : CMY Color model, Transformation from RGB to CMY, Under color removal : CMYK System, printer Gamuts.

Color models in video – Video Color Transforms, YUV color model, YIQ color model, YCbCr Color Model.

Unit III:

Video Concepts: Types of video signals, Analog video, Digital Video.

Audio Concepts: Digitization of sound, Quantization and Transmission of audio.

Unit IV:

Compression Algorithms: Lossless compression algorithms: Run length coding, Variable length coding, Arithmetic coding, Lossless JPEG, Image Compression.

Lossy Image Compression Algorithms: Transform Coding:- KLT and DCT Coding, Wavelet based coding.

Image Compression Standards: JPEG and JPEG2000.

Unit V:

Video Compression Techniques: Introduction to Video Compression, Video Compression based on Motion Compensation, Search for motion vectors,

H.261- Intra-frame and Inter-frame coding, Quantization, Encoder and Decoder, Overview of MPEG1 and MPEG2.

Unit VI:

Audio Compression Techniques: ADPCM in Speech Coding, G.726 ADPCM, Vocoders – Phase Insensitivity, Channel Vocoder, Formant Vocoder, Linear Predictive Coding, CELP, Hybrid Excitation Vocoders, MPEG Audio – MPEG Layers, MPEG Audio Strategy, MPEG Audio Compression algorithms, MPEG-2 AAC, MPEG-4 Audio.

Unit VII:

Computer and Multimedia Networks: Basics of Computer and Multimedia networks, Multiplexing technologies, LAN and WAN, Access networks

Unit VIII:

Multimedia Network Communications and Applications: Quality of Multimedia data transmission, multimedia over IP, Multimedia over ATM networks, Transport of MPEG4, Media on Demand.

Text books:

1. Fundamentals of Multimedia – Ze- Nian Li, Mark S. Drew, PHI, 2010.
2. Multimedia Signals & Systems – Mrinal Kr. Mandal Springer International Edition 1st edition, 2009

Reference Books:

1. Multimedia Communication Systems – Techniques, Stds & Netwroks K.R. Rao, Zorans. Bojkoric, Dragorad A.Milovanovic, 1st Edition, 2002.
2. Fundamentals of Multimedia Ze- Nian Li, Mark S.Drew, Pearson Education (LPE), 1st Edition, 2009.
3. Multimedia Systems John F. Koegel Bufond Pearson Education (LPE), 1st Edition, 2003.
4. Digital Video Processing – A. Murat Tekalp, PHI, 1996.
5. Video Processing and Communications – Yaowang, Jorn Ostermann, Ya-QinZhang, Pearson,2002

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(57607) E-CAD AND VLSI LAB

List of Experiments

Design and implementation of the following CMOS digital/analog circuits using Cadence / Mentor Graphics / Synopsys / GEDA/ Equivalent CAD tools. The design shall include Gate-level design, Transistor-level design, Hierarchical design, Verilog HDL/VHDL design, Logic synthesis, Simulation and verification, Scaling of CMOS Inverter for different technologies, study of secondary effects (temperature, power supply and process corners), Circuit optimization with respect to area, performance and/or power, Layout, Extraction of parasitics and back annotation, modifications in circuit parameters and layout consumption, DC/transient analysis, Verification of layouts (DRC, LVS)

E-CAD programs:

Programming can be done using any complier. Down load the programs on FPGA/CPLD boards and performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates
2. Design of 2-to-4 decoder
3. Design of 8-to-3 encoder (without and with parity)
4. Design of 8-to-1 multiplexer
5. Design of 4 bit binary to gray converter
6. Design of Multiplexer/ Demultiplexer, comparator
7. Design of Full adder using 3 modeling styles
8. Design of flip flops: SR, D, JK, T
9. Design of 4-bit binary, BCD counters (`synchronous/ asynchronous reset) or any sequence counter
10. Finite State Machine Design

VLSI programs:

1. Introduction to layout design rules
2. Layout, physical verification, placement & route for complex design,

static timing analysis. IR drop analysis and crosstalk analysis of the following:

- Basic logic gates
- CMOS inverter
- CMOS NOR/ NAND gates
- CMOS XOR and MUX gates
- CMOS 1-bit full adder
- Static / Dynamic logic circuit (register cell)
- Latch
- Pass transistor

3. Layout of any combinational circuit (complex CMOS logic gate)- Learning about data paths
4. Introduction to SPICE simulation and coding of NMOS/CMOS circuit
5. SPICE simulation of basic analog circuits: Inverter / Differential amplifier
6. Analog Circuit simulation (AC analysis) – CS & CD amplifier
7. System level design using PLL

Note: Any SIX of the above experiments from each part are to be conducted (Total 12)

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(57608) MICROWAVE ENGINEERING AND DIGITAL COMMUNICATIONS LAB

Note: Minimum 12 Experiments to be conducted

Part – A: Microwave Engineering Lab (Any 6 Experiments)

1. Reflex Klystron Characteristics
2. Gunn Diode Characteristics
3. Directional Coupler Characteristics
4. VSWR Measurement
5. Measurement of Waveguide Parameters
6. Measurement of Impedance of a given Load
7. Measurement of Scattering parameters of a Magic Tee
8. Measurement of Scattering parameters of a Circulator
9. Attenuation Measurement
10. Microwave Frequency Measurement

Part – B: Digital Communication Lab (Any 6 Experiments)

1. PCM Generation and Detection
2. Differential Pulse Code Modulation
3. Delta Modulation
4. Time Division Multiplexing of 2 Band Limited Signals
5. Frequency shift keying: Generation and Detection
6. Phase Shift Keying: Generation and Detection
7. Amplitude Shift Keying: Generation and Detection
8. Study of the spectral characteristics of PAM, QAM
9. DPSK :Generation and Detection
10. QPSK : Generation and Detection

Equipment required for Laboratories:

Microwave Engineering Lab:

Microwave Bench set up with Klystron Power Supply

Microwave Bench set up with Gunn Power Supply

Micro Ammeter

VSWR meter

Microwave Components

Digital Communication Lab:

RPS: 0-30V

CRO: 0-20MHz

Function Generators: 0-1MHz

RF Generators: 0-100MHz

Experimental Kits /Modules