STRUCTURE B. E. (ELECTRONICS AND TELECOMMUNICATION),
2003 COURSE-TERM-I

Subject No.	Subject	Teaching Scheme Hrs/Week			Examination Scheme				Total Marks
		Lect.	PR.	Tut	TH	TW	Pract	Oral	
404214	Computer N/Ws	3	--	--	100	--	--	--	100
404215	Voice Networks	4	--	--	100	--	--	--	100
404216	Electronic Product Design	4	--	--	100	--	--	--	100
404217	VLSI Design	3	2	--	100	--	50	25	175
404218	Elective – I	4	2	--	100	25	50		175
404219	Communication Laboratory - I	--	4	--	--	--	50	25	75
404220	Seminar **	--	--	2	--	50	--	--	50
404221	Project ***	--	2	--	--	--	--	--	
	Total	**18**	**10**	**2**	**500**	**75**	**150**	**50**	**775**
Total Hours = Theory 18Hrs + Practical 10 Hrs + Tutorial 2 = 30 Hours									

404218 Elective – I

1. Embedded Systems Design
2. Advanced Power Electronics
3. Advanced Digital Signal Processing
4. Artificial Neural Networks
5. Robotics and Industrial Automation

2003 COURSE-TERM-II

Subject No.	Subject	Teaching Scheme Hrs/Week			Examination Scheme				Total Marks
		Lect.	PR.	Tut	TH	TW	Pract	Oral	
404222	Electronic Measurement Systems	4	--	--	100	--	--	--	100
404223	Telecomm. Networks and Management	4	--	--	100	--	--	--	100
404224	Optical & Microwave Communications	4	--	--	100	--	--	--	100
404225	Elective – II	4	2	--	100	--	50	25	175
404226	Communication Laboratory - II	--	4	--	--	--	50	50	100
404221	Project ***	--	6	--	--	100	--	50	150
	Total	**16**	**12**	**--**	**400**	**100**	**100**	**125**	**725**
Total Hours = Theory 16 Hrs + Practical 12 Hrs = 28 Hours									

404225 Elective – II

1. Advanced Communication Systems
2. Digital Image Processing
3. Biomedical Engineering
4. Audio and Video Engineering
5. System Programming and Operating Systems

Note:

1) All three papers are three hours duration
2) Practical/Oral shall be based on term-work
3) Term-work of Seminar consist of seminar report based on project

** * Exam at the end of II term

404214: Computer Network

Teaching Scheme **Examination Scheme**
Lectures: 3 Hrs/week **Paper: 100 Marks**

Unit I - Introduction to Computer Networks and Transmission Media

Types of Networks, topologies, centralized and distributed networks, LAN, WAN, MAN, Broadcast vs Point to Point networks, overview of wireless networks, Internet. Network design issues, layered architecture, interfaces and services, service primitives and relationships of services to protocols. Overview of network model: OSI and TCP/IP.

Unit II - Physical Layer

Maximum data rate of channel, transmission media-guided and unguided and their types with specifications, Communication satellites (GEO/MEO). Modems and protocols, Multiplexing techniques, circuit switching, message switching, packet switching network, Cable TV and Internet over cable.

Unit III - Data Link Layer (LLC and MAC sub layer)

Framing, error control, flow control, simplex stop and wait protocol, sliding window protocols, data link layer in Internet, HDLC, PPP, SLIP. Static and Dynamic Channel Allocation in LAN, CSMA/CD protocols, collision free protocols, WDMA protocol, IEEE 802 standards for Ethernet, token bus and token ring, DQDB. Bridges, High speed LAN (fast Ethernet, gigabit Ethernet and FDDI).

Unit IV - Networks and Transport Layer

Virtual circuits, and datagram networks, circuit switching, and packet switching. Routing algorithms, routers and routing protocols. Congestion control, and algorithms (issues like delay, load, throughput, jitter etc.). Transport layer services and principles. Connectionless v/s connection oriented services like UDP and TCP, QOS (Quality of Services).

Unit V - Application Layer

Introduction to Cryptography, Secret key and public key algorithm, Security issues for Intranet and Internet, DNS (Domain name System), Electronic mail, World wide Web, Writing a web page in HTML, Introduction to sockets and socket programming, Video on Demand.

Unit VI - TCP/IP Protocol Suite

Layered Architecture, Protocol Stack., IP Addressing: Classes, static, dynamic (DHCP). Ipv4 v/s Ipv6, Sub-netting: masking and subnet masking. Protocols: Ping, FTP, telnet, http(www), SMTP, SNMP, Trace route, TFTP, BOOTP, DNS, NFS, RPC, ICMP, IGMP, ARP, RARP, etc.

Text Books:

1. Andrew Tenenbaum, "Computer Networks", 3rd and 4th Edition, Prentice Hall.
2. Behrouz A. Forouzan, "Data Communications and Networking", 4th Edition, McGraw Hill

Reference Books:

1. D. Comer, "Computer Networks and Internet TCP/IP".
2. William Stallings, "Data and Computer Communications", 7th Edition, Prentice Hall.
3. William Stallings, "Computer Networks", Prentice Hall.
4. Kurse & Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Addison Wesley.

404215: Voice Network

Teaching Scheme | **Examination Scheme**
Lectures: 4 Hrs/Week | **Paper: 100 Marks**

Unit I - Introduction to Telephone Signaling & Switching

Evolution of Telecommunication, Simple telephone communication, basics of switching Systems, electronic switching, digital switching system, circuit switching, message switching, packet switching, switch signaling - subscriber loop, Interoffice (Common Channel signaling, Signaling System No.7)

Unit II - Telecommunication Traffic Engineering

Introduction, service level, Traffic usage, traffic measurement units, traffic distribution, Grade of service, Blocking Probability: Erlang Distribution, Poisson's distribution, Numericals on above topics.

Unit III - Data and Voice Integration

Demand for Integration, Problems of Integration, ISDN, basic structure, and narrowband ISDN, ISDN interfaces- ISDN terminals, Non-ISDN terminals, ISDN Services, packet Switched data, voice over frame relay, Broadband ISDN, ATM and its interfaces, public ATM networks.

Unit IV - Global System for Mobile Communication

Standards for wireless communication systems, Access technologies, Cellular Communication fundamentals, GSM architecture and interfaces, Radio link features in GSM system, GSM logical channels and frame structure, Speech coding in GSM, Data services in GSM, Value added services, Privacy and Security in GSM.

Unit V - Code Division Multiple Access

Spread Spectrum Systems i.e. fundamentals of orthogonal and pseudorandom codes, CDMA standards, IS-95 system architecture, Air Interface, Physical and logical channels of IS- 95, CDMA call processing, Soft Hand-off, security and identification, wireless data, CDMA 2000 system

Unit VI - IP Telephony

Introduction to VoIP, low level protocols -RTP/RTCP/UDP, speech coding technologies PCM, ADPCM, LPC, speech codes ('ITU series and wireless codes including fixed and variable rare, trans-coder technologies including; DTMF generation & detection, Echo Cancellation, Voice activity detection and discontinuous transmission (VAD/DTX), Packet Loss Conceal meat (PLC) IP Telephony Protocols - H.323, H.245 Control Signaling, Session Initiation Protocol (SIP), \1EGACO & H.248, QOS

Text Books:

1. Vijay K. Garg, Joseph E Wilkes, "Principles & Applications of GSM", Pearson Education
2. Vijay K. Garg, "IS-95 CDMA and CDMA 2000", Pearson Education

Reference Books:

1. Bates, Regis J., Gregory, Donald W., "Voice & data Communication Handbook", McGraw Hill
2. Dean, Tamara, "Guide to Telecommunication Technology", McGraw Hill
3. Vijay K. Garg, Kenneth SmoJik, Joseph E. Wilkes, "Applications of CDMA in wireless/Personal Communications", Prentice Hall
4. Tranter William H., Rappaport, "Principles of Communication Systems Simulation", Pearson Education

404216: Electronic Product Design

Teaching Scheme **Examination Scheme**
Lectures: 4 Hrs/Week **Paper: 100 Marks**

Unit I - Product Design and Development

An overview of product development stages: Study of techno-commercial feasibility of specifications (Case study), R & D prototype, Assessment Of reliability (case study), Ergonomic and aesthetic design considerations, Pilot Production batch, QA testing of, products (verification of specifications), Packaging and storage. Estimating power supply requirement (power supply sizing), Study of power supply protection devices: Line filters, Transzorbs, MOVs, Fuses and Suppressor capacitors, Noise reduction, grounding, shielding and guarding techniques, Thermal management.

Unit II - PCB Designing

PCB design: General layout considerations for analog and digital circuits. Power and ground traces routing for better decoupling, Recommendations for decoupling and bypassing, Layout considerations for mixed signal circuits, Component mounting considerations: Study of packages for Discrete devices and ICs, Calculation of parasitic elements in PCB, High-speed, EMI reduction methods in PCB designing, Cross talk, reflections and terminations, Transmission line effects in high-speed PCBs, Mounting in presence of vibration. SMD assemblies, testing of assembled PCBs.

Unit III - Hardware Design and Testing Methods

Use of Logic analyzer, Digital Storage Oscilloscope (DSO), Mixed Signal Oscilloscope (MSO) and Digital Phosphor Oscilloscope (DPO) for hardware testing, Signal integrity issues, Use and limitations of different types of analyses- DC or Operating point analysis, AC analysis, Transient analysis, Monte-Carlo analysis.

Unit IV - Software Design and Testing Methods

Software design methods: Top-down and Bottom-up approaches, ASM / FSM method of design, Decision to use assembly and / or high-level language for software development. Use of assemblers, compliers and cross compilers in developing product software, Software testing using simulators, in-circuit emulators.

Unit V - Product Testing

Environmental testing: Dry heat, Vibration, Temperature cycling, Bump, and Humidity tests as specified in IS standards, EMI/EMC compliance testing, Standardization required for UL and CE certification of industrial electronic products.

Unit VI - Documentation

PCB documentation; Assembly and fabrication related documentation; Laminate grade, Drilling details, Plating, Bare board testing etc. Product documentation: Bill Of Materials, Production test specifications, Interconnection diagrams, Front and rear panel diagrams, Instruction. User manual, Service/Maintenance manual, Software documentation standards, and practices

Text Books:

1. J. C. Whitaker, “The Electronics Handbook, CRC Press, IEEE Press
2. Charles A. Harper, “Electronic Packaging and Interconnection Handbook”, McGraw-Hill Handbooks, ISBN 0-07-143048-2
3. Norman Fuqua, “Reliability Engineering for Electronic Design”, Marcel Dekker INC.
4. Howard Johnson, Martin Graham, “High-speed Digital design- A Handbook of Black Magic”, Prentice Hall Publication

404217: VLSI Design

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs/week	**Paper: 100 Marks**
Practical: 2 Hrs/Week	**Practical: 50 Marks**

Unit-I - VHDL Modeling and Design Flow

Introduction to VLSI: complete VLSI design flow (with reference to an EDA tool), Sequential, Data flow, and Structural Modeling. Functions, Procedures, attributes, Test benches, Synthesizable, and non synthesizable statements; packages and configurations Modeling in VHDL with examples of circuits such as counters, shift registers, bi-directional bus, etc.

Unit-II - FSM And Sequential Logic Principles

Sequential Circuits, Meta-stability Synchronization, Design of Finite State Machines, and State minimization, FSM CASE STUDIES - Traffic Light control, Lift Control and UART STA and DTA

Unit-III - Programmable Logic Devices

Introduction to the CPLDs, Study of architecture of CPLD, and Study of the Architecture of FPGA

Unit IV - System On Chip

One, two phase clock, Clock distribution, Power distribution, Power optimization, SRC and DRC, Design validation, Global routing, Switch box routing, Off chip connections, I/O Architectures, Wire parasitics, EMI immune design. Study of memory-Basics of memory includes types of memory cells and memory architectures, Types of memory, based on architecture specific and application specific viz. SRAM, DRAM, SDRAM, FLASH, FIFO.

Unit V - CMOS VLSI

CMOS parasitics, equivalent circuit, body effect, Technology Scaling, λ parameter, Detail study of Inverter Characteristics, power dissipation, power delay product, CMOS combinational logic design and W/L calculations, Transmission gates, Introduction to CMOS layout.

Unit VI - Testability

Need of Design for testability, Introduction to Fault Coverage, Testability, Design-for-Testability, Controllability and Observability, Stuck-at Fault Model, Stuck-Open and Stuck-Short faults, Boundary Scan check, JTAG technology; TAP Controller and TAP Controller State Diagram. Scan path, Full and Partial scan, BIST

Text Books:

1. John F. Wakerly, “Digital Design, Principles and Practices”, Prentice Hall Publication
2. Neil H. E Weste and Kamran Eshraghian, “Principles of CMOS VLSI Design”.
3. Wyane Wolf, “Modern VLSI Design”
4. Sudhkar Yalamachalli, “Introductory VHDL from simulation to Synthesis”

Reference Books:

1. Perry “VHDL”.
2. Charles Roth, “Digital System Design using VHDL”, McGraw hill.
3. Xilinx Data Manual “The Programmable Logic Data Book".
4. Stephen Brown and Zvonko Vranesic, “Fundamentals of Digital Logic with VHDL Design”, Second Edition, McGraw-Hill, 2005.
5. Michael John Sebastian Smith, “Application-Specific Integrated Circuits”,

Addison Wesley.
6. Wayne Wolf, "FPGA-Based System Design", Prentice Hall,
7. Miron Abramovici, "Digital Systems Testing and Testable Design", Jaico Publishing.
8. Sung-Mo (Steve) kang, Yusuf Leblebici, " CMOS Digital Integrated Circuit", Tata MeGrahill Publication.

LIST OF EXPERIMENTS:

Instructions and Tools to be used:

1. Aim is the Final Experimental Testing on Hardware Prototype for Verification of Correct Functional and Performance Operation of Synthesized Digital System.
2. Tools
    - EDA tool Front-end (including Synthesis, Simulation, place and route).
    - VLSI Trainers with FPGAs and CPLD.

Any 8 assignments out of the following:
Simulation, Synthesis, and Implementation of

1. 8: 1 Multiplexer, 2:4 Decoder, Comparator and Adder.
2. Flip Flop(s), Shift Register and Counter.
3. Lift Controller *I* Traffic Light Controller / UART. Anyone of the three.
4. Purity generator and Checker.
5. Implementation of RAM *I* FIFO.
6. Ramp waveform generator using DAC
7. Bi-directional buffer
8. Temperature sensing using ADC, Displaying on 7-Segment display and threshold setting using keyboard
9. Implementation of 4-bit RISC processor

404218: Embedded System Design

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs./Week	Theory: 100 Marks
Practical: 2 Hrs./Week	Practical: 50 Marks
	Term Work: 25 Marks

Unit I - Embedded System Introduction

History, Design Challenges, optimizing design metrics, time to market, NRE and unit cost, design metrics. Applications of embedded systems and recent trends in embedded systems.

Other protocols like CAN and MOD BUS, wireless communication like Blue tooth, GPRS, IrDa, IEEE 802.11 and 802.16

Unit II - System and Processor Architecture

Hardware and software architecture, processor selection for embedded system, memory Architecture and I/O devices, Interrupt service mechanism, interrupt latency, context switching.

Unit III - Programming Concepts

Interprocessor communication and synchronization of process, tasks, threads, scheduling, device drivers for embedded devices.

Unit IV - Real Time Operating System Concept

Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS.

Unit V - Commertial RTOS

Overview of comemertial RTOS like Vxworks, RT Linux, Ucos, QNX, Nucleus software development life cycle. Introduction to mobile computing.

Unit VI - Case Study of Embedded System

Case study of embedded system like digital camera, smart card, flight simulation and control.

Text Books:

1. Frank Vahid, “Embedded System Design”, Prentice Hall Publication.
2. Rajkamal, “Embedded Systems”, TMH.

404218: Advanced Power Electronics

Teaching Scheme | **Examination Scheme**
Lectures: 4 Hrs/week | **Paper: 100 Marks**
Practical: 2 Hrs/Week | **Practical: 50 Marks**

Unit I - Converters

Analysis of 3-phase full converter, comparison with 3-phase semi converter (derivations for semi converter is not required), Effect of source impedance on single-phase converters with analysis, Single-phase and three-phase dual converters (ideal and practical dual converter, control schemes for non-circulating current type dual converter, analysis of circulating current type dual converter), Series and parallel operation of power devices.

Unit II - Inverters

3-phase VSI (analysis for R load), Voltage control and harmonic reduction in inverters, Space vector modulation, Boost and Buck-boost inverters (analysis), ASCSI with IM as load (analysis of no-overlap region).

Unit III - Resonant converters:

Class E, ZCS and ZVS, Power factor control: PF Improvement in LCC by SAC technique, PF Correction using active wave shaping techniques, Instrumentation in Power Electronics: Measurement & Sensing techniques.

Unit IV

LCC fed separately excited DC motor drives, Stepper Motor Drives, Servo Motor Drives.

Unit V - Induction Motor Drives

Stator voltage control, Slip power recovery scheme (LCC based Scherbius Drive), V/F Drive, Vector control, Brushless DC motor drive (3-phase full wave), Protection circuits for AC and DC motor drives, Braking techniques for separately excited DC motor and Induction motor.

Unit VI - Power Quality

Types of power line disturbances, Sources of power line disturbances, Preventive and nullifying measurement techniques, Measurement of power line disturbances. Energy audit

Text Books:

1. M. H. Rashid, "Power Electronics", 3e, Pearson Education, 2004,
2. Mohan, Undeland & Robbins "Power Electronics", 3e, John Wiley, 2003
3. B.K. Bose, "Modern Power Electronics & AC Drives", Pearson Education, 2002,

Reference Books:

1. Dubey, Doradla, Joshi & Sinha, "Thyristorised Power Controllers", New Age International, 1986.
2. Singh & Khanchandani, "Power Electronics", Tata McGraw Hill, 1998.
3. P. C. Sen, "Thyristor DC Drives", John Wiley, 1981.

LIST OF EXPERIMENTS:

Any 6 experiments from 1 to 8 with 9 & 10 being compulsory

1. Study of Dual Converter (1-Φ or 3-Φ).
2. Study of 3-Φ VSI (180^o or 120^o).
3. 2 Q or 4 Q Chopper DC Drive.
4. LCC (1-Φ or 3-Φ) based DC Drive.
5. Resonant converter (Class E or ZCS or ZVS or SLR or PLR).
6. Power factor improvement techniques (SAC or EAC or PWM)
7. Study of VVVF 3-Φ IM Drive.
8. Sensing and Protection circuits for AC and DC Drives.
9. Simulation of 3-Φ LCC (HCB or FCB or Dual Converter).
10. Simulation of 3-Φ VSI (120^o or 180^o or PWM)

404218: Advanced Digital Signal Processing

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hrs/week	**Paper: 100 Marks**
Practical: 2 Hrs/Week	**Practical: 50 Marks**
	Oral: 25 Marks

Unit I - Random Signals & Multi-rate DSP

Characterization of random signals: review of deterministic signals, random signals, correlation function, power spectra, DT random signals, time averages for DT random process.

Multi-rate DSP: Decimation, Interpolation, design of practical sampling rate conversion, software implementation of sampling rate converters, sample rate conversion using poly-phase filter structures, Efficient D/A conversion in Hi-Fi systems.

Unit II - Adaptive filters

Need of adaptive filters, adaptive filters as noise cancellation, configuration of adaptive filters, main components of adaptive filters, Adaptive Algorithms: LMS adaptive algorithms, recursive least square algorithms, Adaptive filtering of ocular artifacts from the human EEG, adaptive telephone echo cancellation.

Unit III - Linear prediction and optimum linear filters

Lattice structures, innovation representation of random process, rational power spectra, AR, MA & ARMA, forward & backward linear prediction, Wiener filter for filtering and prediction, Solution of the normal equation- Levinson - Durbin algorithm.

Unit IV - Power Spectrum Estimation

Estimation of Spectra From Finite duration observation of signals, Estimation of autocorrelation and power spectrum of random signal, Non parametric methods for power spectrum estimation- Bartlett window and Welch method.

Unit V - Architectures for DSPs

Basic Generic Architectures for DSPs, Harward Architecture, Introduction to SHARC, Pipelining, MAC, special Instructions, on chip memory, Fixed and Floating point DSPs, Selection of DSPs, case study of TMS320c54XX, Implementation of Basic DS algorithms, like FIR, IIR Filters, Decimation and Interpolation.

Unit VI - Speech Processing

Speech Theory, and Speech Processing

Text Books:

1. E. C. Ifleachor and B. W. Jervis, "Digital Signal Processing- A Practical Approach", 2nd Edition, Pearson education.
2. John G. Proakis, Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", Pearson education.
3. Avtar Singh, S. Srinivasan, "Digital Signal Processing Implementation using DSP, Microprocessors with examples from TMS 320C54XX", Thomas Publication.
4. Rabinar, Gold, "Speech Signal Processing".

Reference Books:

1. P. P. Vaidyanathan, "Multirate Systems and filter banks", PHI.
2. B. Venkatramani, M. Bhaskar, "Digital Signal Processors, Architecture, Programming & Applications", TMH.
3. "A Handbook of Digital Image Processing", IEEE Press.
4. Simon Haykins, "Adaptive Filter Theory", 4th Edition, Pearson Education, 2002,
5. "Texas Manual for DSP Processors & Starter kit".

6. www.dspguide.com
7. C.Britton, Rorabaugh, " DSP Primer", by Tata McGraw Hill.

List of Practical Assignments:

- **Any five from 1 to 8, Assignment 9 is compulsory, Any two assignments form 10-13.**

1. Generate random signals and plot their realization.
2. Software implementation of Decimation and interpolation
3. Implementation of Least Mean Square (LMS) Algorithm.
4. Determination of FIR prediction filters using Forward and Backward prediction.
5. FIR or IIR Filter Implementation using VLSI
6. To implement Levinson Durbin Algorithm for Solution of Normal equations.
7. Realization of cascade Lattice of FIR Filter.
8. Power Spectrum Estimation using any one non-parametric method.
9. Demonstration of Hardware and Software utilities for DSP starter kits (Texas, ADSP or Motorola).

Implementation of the following DSP Algorithms on DSP processors:

10. Implementation of FIR Filter.
11. Implementation of IIR Filter.
12. Implementation of Interpolation.
13. Implementation of Decimation.

404218: Artificial Neural Networks

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	Paper: 100 Marks
Practical: 2 Hrs/Week	Practical: 50 Marks
	Oral: 25 Marks

Unit I

Introduction Trends, characteristics of Neural Network, models of neuron, Topology, Basic Learning Laws, Activation Dynamics models, Synaptic Dynamics models, Learning Methods, stability and convergence

Unit II

Supervised learning neural networks: adaptive networks, Adaline and Madaline, Single layer and Multi layer perceptrons, radial Basis function networks, modular neural networks

Unit III

Feedback neural Networks: Analysis of linear auto adaptive Feed Forward networks, Analysis of pattern storage Networks, stochastic Networks & simulated annealing, Boltzman machine.

Unit IV

Unsupervised learning networks: Competitive learning, Kohonen self- organizing maps, learning vector quantization, principal component analysis of Hebbian Learning, adaptive Resonance theory.

Unit V

Architecture for complex pattern Recognition tasks:
Associative memory, Pattern mapping, Stability - Plasticity dilemma: ART, temporal patterns, Pattern visibility: Neocognitron.

Unit VI

Applications of ANN: pattern classification, associative memories, optimization, Application in speech, application in Image processing, application in decision making.

Text Books:

1. B. Yegnanarayana, "Artificial Neural Networks", Prentice Hall India.
2. James A. Freeman, David M. Skapura, "Neural Networks - Algorithms, Applications and Programming Techniques", Pearson Education.

Reference Books:

1. Haykin, "Neural Network a comprehensive Foundation", Prentice Hall India.
2. Mohan, Ranka, "Elements of Artificial Neural Networks", Penram International.
3. Anderson, "An Introduction to Artificial Neural Networks", Prentice Hall.
4. William J. Palm III, "Introduction to MATLAB 7 for Engineers", by Tata McGraw Hill

List of Assignment:

All the assignments are based on MATLAB

1. Design & implement artificial neural network to compute XOR for the two inputs using feedback artificial neural network.
2. Implement MR II (Madaline rule II) algorithm.
3. Simulate Adaline algorithm.
4. Implement back propagation simulator.
5. Implement the BAM simulator. Test the BAM with two training vectors.
6. Implement the Boltzman simulator.
7. Implement ART1 simulator.

404218: ROBOTICS & INDUSTRIAL AUTOMATION

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	Paper: 100 Marks
Practical: 2 Hrs/Week	Practical: 50 Marks
	Oral: 25 Marks

Unit I - Introduction

Automation and Robotics, Definition, Basic Structure of Robots, Classification of Robots based on co-ordinate system, Present trends and future trends in robotics, Overview of robot subsystems, Components of Robot system-Manipulator, Controller, Power conversion unit etc, Specifications of robot.

Unit II - Dynamics & Kinematics

Dynamic constraints, velocity & acceleration of moving frames, Robotic Mass Distribution & Inertia, Tension, Newton's equation, Euler equations, Dynamic Modeling of Robotic Manipulators. Homogeneous co-ordinate vector operations, matrix operations, co-ordinate reference frames, Homogeneous transformation and manipulator orientation relative points reference frames, forward solutions- Link co-ordinate frames, D-H matrix, Inverse or back solutions- problem of obtaining inverse solution, techniques of using direct & geometric approach.

Unit III - End Effectors and Actuators

Different types of grippers, vacuum & other methods of gripping, overview of actuators, Internal & External sensors, position, relocking and acceleration sensors, proximity sensors, force sensors, touch slip laser range tinder, camera.

Unit IV - Motion Planning and Controllers

On-off trajectory, relocking and acceleration profile, Cartesian motion of manipulator, joint interpolated control, Jacobian in terms of D-H matrix, Obstacle avoidance, Basic control system, control loops of robotic system, Fuzzy controllers**.**

Unit V - Robot Vision

Machine Vision system, description, sensing, Digitizing, Image Processing and Analysis and Application of Machine Vision System, Robotic assembly sensors & Intelligent Sensors. Object recognition.

Unit VI - Robots for Industrial Automation

Need for Automation, Robotics for automation. Robot Intelligence and Task Planning, MEMS (Micro Electro Mechanical Systems) – Introduction and working principle, Nano-robots

Text Books:

1. Fundamentals of Robotics: Analysis and Control – *Robert J Schilling,* PHI, NewDelhi
2. Robotic Engineering – *Klafter, Thomas, Negin,* PHI, New Delhi

Reference Books:

1. Robotics for Engineers – *Yoram Koren,* McGraw Hill, New York
2. Fundamentals of Robotics – T.C. Manjunath, Nandu Publishers, Mumbai
3. Robotics and Control- R. K. Mittal, I. J. Nagrath, TMH, NewDelhi
4. MEMS and Microsystems Design and Manufacture- HSU, TMH, NewDelhi

Practical:

1) Study of motion conversion (rotary to rotary, rotary to linear) using mechanical components.
2) To build robot arms using mechanical components and applying motor drive.
3) To build robot for given configuration and degrees of freedom.
4) Motion of robot for each degree of freedom. Teaching a sequence to robot using Teach Pendant.
5) To perform pick and place operation using Simulation Control Software.
6) Robot path planning using Simulation & Control Software.
7) Study of Pneumatic Robot OR Study of Robot Vision System.
8) 2D simulation of a 3 DOF robot arm. (C / C++ OR MATLAB)
9) Direct Kinematics analysis of 4-axis robot. (C / C++ OR MATLAB)

404219: COMMUNICATION LABORATORY-I

Teaching Scheme | **Examination Scheme**
Practical: 4 Hrs/Week | **Practical: 50 Marks**
Oral: 25 Marks

A: List of the Experiments Computer Networks:

1. Implementation of LAN using star topology and connectivity between two computers using cross over UTP CAT5 cable.
2. Installation and configuration of Web Server/ Proxy Server.
3. Installation and configuration of network applications like FTP and Telnet.
4. Connectivity of LAN computers to Internet using Dial-Up modem/leased line modem. (Installation and configuration).

B: List of Practical Assignments

1. Study techno-commercial feasibility of specifications (Case study). Error budget analysis and its verification by constructing the circuit up to ADC.
2. Reliability assessment of any given product (Case study) and Power supply sizing for any CMOS digital circuit (calculation of static and dynamic power requirements).
3. Use of logic analyzer, DSO *I* MSO in hardware debugging. . 1.
4. DC, AC and Transient analysis of a circuit using simulation package 'like Multiuse. Comparison with actual circuit by building it and testing its, performance.
5. Temperature cycling test for an instrument using oven (laboratory oven)

C: List of Assignments for Voice Networks:

1. Simulation of any one of the PSTN switch configuration T/S/T switch.
2. Study of GSM trainer
3. Study of CDMA trainer
4. Study of Mobile set trainer.
5. Study of VOIP protocol implementation.

404220: SEMINAR

Teaching Scheme **Examination Scheme**
Tutorial: 2 Hrs/Week **Term Work: 50 Marks**

Note:

1. Seminar is based on the project topic. It consists of Literature Survey and basic project work. The abstract of the project should be submitted before the examination of seminar.

2. The seminar report consists of the Literature Survey basic project work and the size of the seminar report should be maximum of 40 pages.

3. The examination is conducted by two examiners (internal and external) appointed by the university. The examiners appointed for seminar must have minimum 6 years of experience with UG qualification and 3 years with PG qualification.

4. At the time of examination, the student will have to give the presentation, and seminar assessment is based on Innovative Idea, Depth of understanding, Applications, Individual contributions, and presentation, and the grade given by the internal guide, which is based on the work carried out in a semester.

5. A certified copy of seminar report is required to be presented to external examiner at the time of final examination.

404221: PROJECT

Teaching Scheme
Practical: 2 Hrs/Week (Sem –I)
Practical: 6 Hrs/Week (Sem-II)

Examination Scheme
Term work: 100 Marks
Oral: 50 Marks
**** Exam at the end of second term**

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1. Group Size

The student will carry the project work individually or by a group of students. Optimum group size is in 3 students. However, if project complexity demands a maximum group size of 4 students, the committee should be convinced about such complexity and scope of the work.

2. Selection and approval of topic

Topic should be related to real life application in the field of Electronics and Telecommunication

OR

Investigation of the latest development in a specific field of Electronics or Communication or Signal Processing

OR

The investigation of practical problem in manufacture and / or testing of electronics or communication equipments

OR

The Microprocessor / Microcontroller based applications project is preferable.

OR

Software development project related to VSDL, Communication, Instrumentation, Signal Processing and Agriculture Engineering with the justification for techniques used / implemented is accepted.

OR

Interdisciplinary projects should be encouraged. The examination will be conducted independently in respective departments.

Note:

The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by internal and external guides.

Project report must be submitted in the prescribed format only. No variation in the format will be accepted.

One guide will be assigned at the most 3 project groups.

404222: Electronics Measurement Systems

Teaching Scheme **Examination Scheme**
Lectures: 4 Hrs/week **Paper: 100 Marks**

Unit I

Accuracy, Resolution, Precision, Linearity of measuring instruments, Voltage, Current, Resistance, Measurement using DMM- 4 1/2 & 6 ½, Auto zero, Auto ranging. True RMS Measurement Principle, method & application, Phase and Magnitude Measurement at high frequency using instruments such as vector voltmeter and vector impedance meter, LCR-Q meter - principle of digital LCR-Q meter, Important specification & Application.

Unit II

Standards - Primary, secondary, working. Need of calibration, Procedure, Traceability & It's requirements, Statistical Analysis - Mean, Mode, Deviation, Variance & Probability for error finding. Regression Analysis, Various methods & it's advantages, Time, Frequency, Ratio, Time interval, Period & Multiple Period averaging using digital universal frequency counter, High frequency measurements on frequency counter using various techniques, such as pre-scalar, Heterodyne, Time standards - Stability using oscillators like TCXO, OCXO.

Unit III

Overview of analog CRO, dual/ Multi-trace CRO, Block diagram, functioning, specifications & Applications, Various CRO probes & its applications.

Digital Storage Oscilloscope - Block Diagram, Functioning, specifications & Applications, Advantages as compared to analog CRO, Sampling speed & Memory depth of DSO, Design considerations, Attachments to DSO for enhancing the functionality / Measurements such as FFT, MATHS Functions, Automatic Measurements.

Unit IV

Signal Analyzing instrument, harmonic and wave analyzer, distortion factor meter spectrum analyzer - FFT analyzer, logic analyzer, Protocol analyzer, for all above mentioned instruments, explanation of block diagram with function of each block, important specification and applications of each.

Unit V

Communication measurements, Measurements on transmitter and receive: sensitivity, selectivity, phase jitter, s/n ratio, co-channel interference, SINAD test etc. Network analyzer- system element, measurement accuracy, scalar network analyzer, vector network analyzer, S-parameter measurement using network analyzer

Unit VI

Computer controlled test measurements, Virtual measurements and its application in TDM, FDM, ASK, PSK, IEEE 488, PCI/PCI express , buses, Introduction of Lab view

Text Books:

1. A. J. Bowon, “Digital Communication”.
2. Oliver Cage, “Electric Instrumentation”, Tata McGraw Hill.
3. H.S. Kalsi, “Digital Instrumentation”, Tata McGraw Hill.

Reference Books

1. Coombs “Electronic Instrumentation Handbook”.
2. Cooper Herfric, “Electric Instrumentation & Measurement Techniques”, Prentice Hall Publication.
3. J. J. Carr, “Digital Instrumentation”
4. M. M. S. Anand, “Electric Instrument & Instrumentation Techniques”

404223: Telecom Networks and Management

Teaching Scheme **Examination Scheme**
Lectures: 4 Hrs/week **Paper: 100 Marks**

Unit I - Introduction to Telecom Networks
Types of Networks, Network Design Issues, Data Support, Design Tools, Switching Technologies (Circuit Switching, Packet switching, Virtual switching)

Unit II - Broadband Telecom Networks
ISDN, Frame Relay, ATM, SONET/ SDH

Unit III - Broadband Access Technologies
DSL, Cable Modems, WLL, Optical Wireless, Leased lines, Dynamic Routing

Unit IV - Routing Technologies
Routing Algorithms for shortest path, Centralized routing, Distributed Routing, Static Routing, Dynamic Routing.
]
Unit V - QoS and Reliability Issues of Telecom Networks
Delay, Jitter, Throughput / Bandwidth, Crosstalk / Interference Issues, Network Reliability and Survivability Issues, Network Protection Mechanisms

Unit VI - Telecom Network Management
Telecom Network Operation and Maintenance, Traffic Management, Management of Transport Networks, Configuration Management, Fault Management, Security, Network Planning Support, Network Management using SNMP: Object Management, Management Information Base, Traps.

Text Books:

1. Aaron Kershenbaumj "Telecommunication Network Design Algorithms", MGH
2. Mischa Schwatriz, "Telecommunication Networks: Protocols, Modeling and Analysis", Pearson Education.

Reference Books:

3. Cole, “Introduction to Telecommunications: Voice, Data and The Internet", Pearson Education.
4. Flood, "Telecommunication Switching, Traffic and Networks", Pearson Education.
5. Kundan Mishra, "OSS for Telecom Network", Springer.

404224: Optical And Microwave Communication

Teaching Scheme **Examination Scheme**
Lectures: 4 Hrs/week **Paper: 100 Marks**

Unit I - Introduction to OFC & its components

Basic block diagram of Optical Fiber Communication system, Overview of OFC, Advantages of optical fibers over co-axial cables, basic principles, types of fibers, fiber materials, fiber fabrication (double crucible method) and their mechanical properties, Fiber cable, Basics of construction and characteristics of light sources (LED and LASER), light detectors (PIN and APD), Numericals based on above topics.

Unit II - Signal Degradation in Optical Fiber

Various degradation mechanisms: Attenuation, Distortion, Pulse broadening in GI fibers, Mode coupling, Coupling losses, Material dispersion (Intermodel and Intramodel dispersion), Concept of fiber splicing, coupling methods and their losses, OTDR (Principle, concept & applications), Numericals based on above topics.

Unit III - FOC System

Analog: Overview of analog links, Carrier to Noise Ratio, Multi channel transmission technique.

Digital: Point-to-point links, system consideration, Link power budget, Rise time budget, Correlation of concept of line coding and error correction for optical fiber, Principle of Wavelength Division Multiplexing, Passive components, Optical Amplifier, Optical networks: SONET/SDH, Photonic switching and sensor applications, Numericals based on above topics.

Unit IV - Microwave Wave-guides and Components

Rectangular wave-guide, Modes (TE and TM), Excitation of modes, Power transmission and losses, Microwave cavity resonator, Wave guide Tees (E, H, Magic), Circulators, Isolators, Bends, Twists, Matched termination, Attenuators, Phase shifters, Co-axial to wave guide transitions, microwave filters, concept of Scattering parameters, S-matrix of above components, Numericals based on above topics.

Unit V - Microwave Tubes

Introduction to conventional vacuum tubes (triode, Tetrode, Pentode), High frequency limitations, Klystrons (multi cavity, reflex): velocity modulation, bunching process, applications, TWT: slow-wave structure, wave modes, gain, and applications, Magnetron oscillator, types, Numericals based on above topics.

Unit VI - Solid-State Microwave Devices

Principle of operation, construction, characteristics, parameters with analysis of Microwave transistor, Varactor Diode, Tunnel, PIN Diode, Gunn Diode, Construction and applications of strip line, Introduction to terrestrial microwave link and its applications.

Text Books:

1. G. Keiser, “Optical Fiber Communication”, McGraw Hill.
2. D. C. Aggarwal, “Fiber Optical Communication”.
3. S. Y. Liao, “Microwave Devices & Circuits”, Prentice Hall.
4. M. Kulkarni, “Microwave and radar Engineering”, Laxmi.

Reference Books:

1. John Senior, “Optical Fiber Communication”, Prentice Hall.
2. Peter Rizzi. “Microwave Engineering”, McGraw Hill.

404225: Advanced Communication Systems

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	Paper: 100 Marks
Practical: 2 Hrs/Week	Practical: 50 Marks
	Oral: 25 Marks

Unit I - WDM concept and components

Principle of WDM, DWDM, Passive components like couplers (all types), Multiplexers, Filters, Tunable sources, Tunable filters, Optical Amplifiers, Types, Semiconductors, EDFA, Amplifier noise, System application, Wavelength converter, standards for WDM

Unit II - Optical Networks

Basic networks, SONET / SDH, Broadcast & select WDM OXC, MEMS as OXC, non-linear effects on n/w performance, solutions; Ultra high capacity N/W's, FDDI, Optical Ethernet, ATM, FITL, HFC, FTTC, FTTS, FTTN; OCDMA, OTDR, optical spectrum analyzer; Optical sensors (Integrated Optics), distance measure, current, temperature.

Unit III - Introduction to Satellite Communication Systems

Satellite Communication overview, Orbital Mechanics, Look Angles, Orbital perturbations, Sun and Moon effects; Attitude and Orbit Control System, Telemetry; Tracking Commands and Monitoring System, Power System, Communication systems, Transponders, Different types of Antennas and relationships, Antennas used in practical systems.

Unit IV - Modulation and Multiplexing Techniques for Satellite Communication Systems

Frequency Modulation techniques, Waveform Equation, Bandwidth of Signals, Pre – emphasis and De-emphasis, Analog FM Transmission by Satellite for TV signals, Signal Noise Ratio, FM Threshold, Data transmission using Analog FM channels, Digital Transmission on Satellite Channels; Digital Modulation and Demodulation, Modulation and Coding, Bit and Symbol Error Rates, BPSK / QPSK Bit Error Rates, Generation of QPSK and variants, SNR for Digital Voice Systems.

Unit V - Satellite Link Design

Basic Transmission Theory, System Noise Temperature and G/T Ratio, Down / Up link Budgets, Satellite System using Small Earth Stations, design for Specified C/N, Link design procedures in C and Ku Band, Rain Effect in Ku Band.

Unit VI - Multiple Access and VSAT Systems

FDMA, TDMA and CDMA Multiple Access Systems, VSAT Systems, Network Architectures, VSAT-Earth Stations Engineering, Calculation of Link Margins for Star networks, System Design Procedures, Application for DBS TV and Radio, C / Ku Band satellite TV, Digital DBS, DBS TV System Design, Link Budgets.

Text Books:

1. Gerd Keiser, "Optical fiber communication" 3rd edition, McGraw Hill.
2. G. P. Agarwal, "Fiber communication systems" 3rd edition, John Wiley & Sons
3. Timothy Pratt, Charles Bostian, Jeremy Allunut "Satellite Communications" Second Edition, John Wiley & Sons.

List of Practical Assignments

1. Determination of Look Angles for Satellite Antenna at a given site.
2. Determination of Radiation Pattern of Antenna (Main Lobe + two side Lobes).
3. Determination of G/T of receiving Systems.
   a) Determination of Signal to Noise ratio for Analogue Satellite Receiving systems at Baseband.
   Or
   b) Determination of BER for VSAT.
4. Programme for Simulation of satellite link design using tools such as Matlab.
5. Study of WDM
6. Power Budget Presentation for basic Optical Network using Optisim or equivalent software.
7. Study of optical sensors
8. Case study of optical network.

404225: Digital Image Processing

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	Paper: 100 Marks
Practical: 2 Hrs/Week	Practical: 50 Marks
	Oral: 25 Marks

Unit I - Digital Image Processing

Components of Image Processing Systems, Elements of Visual perception, MTF of Visual System, Image Sensing and Acquisition, Image Sampling and Quantization, Basic pixel relationship, Statistical Properties: Histogram, Mean, Standard Deviation, Profile, Different Distributions.

Unit II - Image Transforms and Color Fundamentals

Properties of 2-D Transforms, Discrete Fourier Transform, Discrete Cosine Transform, Walsh/Hadamard Transform, Harr Transform, K-L Transform, Color Image Fundamentals, Chromaticity Diagram, Color Model :RGB, HSI, YIQ; RGB to HSI and HSI to RGB conversion.

Unit III - Image Enhancement

Enhancement in Spatial Domain: basic gray level transformations, histogram processing, enhancements using arithmetic and logical operations, basics of spatial filtering, smoothening and sharpening spatial filters, Enhancement in frequency Domain: smoothening and sharpening frequency domain filters, Pseudo Color Image Processing, Basics of full color Image Processing.

Unit IV - Image Coding and Compression

Image Coding Fundamentals, Image Compression Model, Error Free Compression, VLC, Huffman, Arithmetic, RLC, Lossless Predictive coding; Lossy-Compression, Lossy Predictive Coding and Transform Coding, Image Compression Standards : JPEG Baseline Coder Decoder.

Unit V - Image Analysis

Morphological Image Processing: Dilation, Erosion, Opening, Closing on Binary Images, Skeleton; Segmentation: Point, line, Edge detection, Boundary detection and Thersholding; Image Representation and description – Boundary Representation by Chain Codes and B-splines, Hough Transform.

Unit VI - Image restoration & Image Processing Applications

Image Degradation Model, Noise Models, and Restoration in Presence of Noise in spatial Domain, Linear Filtering, Applications: Character Recognition, Fingerprint Recognition, Remote Sensing.

Text Books:

1. Gonzalez and Woods, “Digital Image Processing”, 2nd Edition, Pearson Education.
2. Arthur Weeks Jr., “Fundamentals of Digital Image Processing”, PHI.

Reference Books:

1. A. K. Jain, “Digital Image Processing”.
2. Pratt, “Digital Image Processing”.

List of Practical Assignments:

All the assignments except No. 10 should be done using ‘C’.

Optional MATLAB support may be given to relevant assignments.

1. Study of different file formats e.g. BMP, TIFF and extraction of attributes of BMP.
2. Study of statistical properties- mean, standard deviation, profile, variance and Histogram plotting.
3. Histogram equalization & modification.
4. Gray level transformations such as contrast stretching, negative, power law transformation etc.
5. Spatial Domain filtering- smoothing & sharpening filters.
6. DCT/IDCT of given image.
7. Edge detection using Sobel, Prewitt and Roberts operators.
8. Morphological operations- erosion, dilation, opening & closing on binary image.
9. Pseudo coloring.
10. Creating noisy image and filtering using MATLAB.

404225: Bio-Medical Electronics

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	Paper: 100 Marks
Practical: 2 Hrs/Week	Practical: 50 Marks
	Oral: 25 Marks

Unit I

Introduction to Biomedical System, Man Machine Interface, Bio-electric Signals, Types of Electrodes, Electrodes for ECG, EMG, EEG, Transducers and sensors related to biomedical measurements including respiration, Skin contact impedance, Motion artifacts, Fiber Optic sensor for temp.

Unit II

Cardiovascular System, Heart Anatomy, Functioning of System, ECG Amplifiers, ECG Machine, B. P., Heart Rate, Heart Sound, Blood Flow Measurements.

Unit III

Phonocardiography, Echocardiography, Vector Cardiography, Stress Testing System, Beside Monitors, Central Monitoring System, Pacemakers, Defibrillators, Grounding and Shielding, Patient Safety.

Unit IV

Colorimeter, Spectrophotometer, Autoanalyser, Flamephotometer, PH/Blood Gas Analyzer, Pulse Oximeter, Hemodialisis, Blood Cell Counter, Study of Essential Parameters of Recorders Related to Biomedical Engineering. Non-Fed CRO, Mediscope.

Unit V

Nervous System-Anatomy, Human Brain Recording of EEG Signal, EEG Amplifier, Analysis of Diseases using EEG Electromyography.

Unit VI

Diagnostic Medical instruments such as CT Scan, MRI, Ultrasonic Doppler Machine, Lasers in Medicine- Vision Correction, Dermatological.

Text Books:

1. Cromwell, “Biomedical Instrumentation and Measurement”, PHI.
2. Webster, “Application and Design of Medical Instruments".
3. R. S. Khandpur, “handbook Biomedical Instrumentation”, by Tata MaGraw Hill
4. Carr and Brown, “Biomedical Instrumentation”.

List of Practical Assignments:

Students are expected to perform maximum 8 practicals from the list mentioned below.

1. To study and check specifications of an ECG Recorder.
2. To Design and implement an ECG calibrator/Phonocardiography
3. To measure Blood Pressure using Sphygmomanometer, Calibration of BP apparatus.
4. Study of Pacemaker, defibrillators
5. To design a Clinical Thermometer.
6. To record/monitor heart sounds using Electronic Stethoscope
7. To implement Heart rate Meter.
8. Study of EEG/EMG Machine.
9. Study of Bedside Monitor, Drip Rate Monitor (ICU Monitor).
10. Study of Dialysis System.
11. Study of Clinical Lab Instrumentation.
12. Study of Laser Treatments in Medicines.

404225: Audio Video Engineering

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	Paper: 100 Marks
Practical: 2 Hrs/Week	Practical: 50 Marks
	Oral: 25 Marks

Unit I

Color TV systems, Television basics, color fundamentals, mixing of colors, color perception, chromaticity diagram, color TV camera and picture tubes, Display devices FL, LCD, TFT.

Unit II

NTSC, PAL, SECAM systems, color TV transmitter, high level, low level transmitters, color TV receivers, remote control, antenna transmission. TV alignment and fault finding with wobbuloscope and TV pattern generation, field strength meter.

Unit III

Introduction to Digital TV, Principle of Digital TV, Digital TV signals and parameters, MAC signals, advanced MAC signal transmission, Digital TV receivers, NTSC, DTV, MPEG 2, JPEG 4 MAC production tools. Digital compression techniques, HSLD, GSID, digital TV recording technique/broadcasting

Unit IV

HDTV standards and systems, HDTV transmitter and receiver/encoder, satellite TV, video on demand, CCTV, CATV, direct to home TV, set top box, conditional access system (CAS), introduction to 3D stereoscopic, DTV systems, digital broadcasting, case study (Cricket match, Marathon, Foot ball match).

Unit V

Methods of sound recording and reproduction, optical magnetic recording, CD recording, CD DVD player, MP3 player, audio std. MPEG

Unit VI

Studio Acoustics, reverberation, PA system for auditorium, Acoustic chamber, chord less microphone systems, special type of speakers/ cell phones. Introduction to satellite radio reception (world space)

Text Books:

1. Television and video Engineering, A. M. Dhake, TMH Publication.
2. Video Demisified, Kelth jack, Penram International Publication.
3. Audio Video Systems, R.G. Gupta, Technical Education.

Reference Books

1. Color TV Theory and Practice, S. P. Bali.
2. Basic TV and Video Sytems, Bernard Grobb, Charles E.
3. Monochrome & Color TV, Gulathi.

List of Practical Assignments

1. Voltage and waveform analysis for color TV.
2. Alignment & fault finding for color TV using Wobbulosocpe & Pattern Generator.
3. Study of direct to home TV and set top box.
4. Study of VCR.
5. Simulation of video compressing techniques.
6. Practical visit to TV transmitter/studio.
7. Study of PA system with chord less microphone.
8. Study of Audio system. CD players and MP3 player, Satellite Radio.
9. Study of HDTV.
10. Study of Digital TV.

404225:System Programming and Operating System

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	**Paper: 100 Marks**
Practical: 2 Hrs/Week	**Practical: 50 Marks**
	Oral: 25 Marks

Unit I - Basics of System programming:

Language processes, Language processing activities, Fundamentals of language processing, Language processes development tools.

Data structures of language processing: search data structure, Allocation data structures. Need of system software, translated types, compiles, assembles, loaders linker and preprocessor

Introduction to compliers: Basic compliers function, Phases of compilers 9 with a simple, example of assignment statement in C- shoring how each phase of complier)

Unit II - Assemblers and Microprocessor:

Assemblers: structures of assembler assembly process, machine dependents, In dependents assemblers features. Pass-I & Pass-II of assemblers design (with 8086), Design of single pass assemblers, Advantages of and Disadvantages of dingle pass Assemblers.

Microprocessor: Macro definition and call, macro expansion, Machine Independent macro processor features, Nested macro calls, advanced macro facilities, Design of microprocessor.

Unit III - Loaders and Linkers:

Basic loaders functions, central loaders scheme Absolute loaders, Subroutine linkers, relocation Loader, Direct linking loader, Dynamic linking loader, Design of absolute loaders direct linking loader, Implantation of MS DOS linker,

Unit IV - Operating System:

Evolution of O. S. Function: Batch processing system, Multiprogramming systems, Time-sharing systems, real time systems, O.S. structures, Processor Management: Concept of a process, process definition, process control, interacting processes

Scheduling: policies, Job Scheduling, Process scheduling

Deadlocks: Definition, Handing deadlocks detection and resolution avoidance

Process Synchronization; implementing control Synchronization, critical sections semaphores classical process synchronization problems Introduction to intercrosses communication.

Unit V - Memory management

Contiguous memory allocation, Non-Contiguous memory allocation, Virtual memory using paging, Virtual memory using Segmentation , File Systems: Directory structure , file protection , allocation of disk space, Implementing file access , File sharing , File system reliability, Case study FAT 32 NFS.

Unit VI - I/O Organization and I/O Programming:

I/O Organization, I/O devices, Physical IOCS, Fundamental file I/O Organization, Advanced I/O Programming, Case Study: Devices drivers for USB, Serial port and parallel port.

Text Books:

1. D. M. Dhamdhare, “Systems Programming and Operating System”, TMH.
2. Leland L. Beck, “System Software,” Pearson Editions.

Reference Books:

3. A. S. Tanenbaum & Ablert Woodhull, “Operating Systems”, Pearson Editions.
4. J. J. Donovan, “Systems Programming”, McGraw Hill

404226: Communication Laboratory – II

Teaching Scheme
Practical: 4 Hrs/Week

Examination Scheme
Practical: 50 Marks
Oral: 50 Marks

A) List of practical:

1. Peak average and r.m.s measurement on power electronics, phase controlled rectifier using SCR.
2. Calibration of DVM for any one range: e.g. 200 V dc, 200 V ac, 200mA dc, using Standard calibrator or standard 61/2 DMM.
3. Measurements on spectrum analyzer: i) Carrier and Sideband power of AM/FM, Signal, ii) Percentage modulation, iii) Channel Bandwidth, iv) S/N Ratio.
4. Measurements on DSO: i) FFT analysis of LF signal, ii) Capturing transients, iii) Measuring ON/OFF Time of a Relay, iv) Storing and Retrieving number of different signals, v) Study of various operations like add, subtract, multiply, integrate, differentiate.
5. Measurements on Logic analyzer: Timing analysis and State analysis of a Microcontroller based system.

   OR

   Experiment with virtual instruments using software such as Lab view
6. Measurement of Sensitivity, Selectivity, Fidelity of a Communication Receiver.
7. Measurement of electromagnetic interference of a SMPS or any other power circuit using CE method.

B) List of Practicals

1. Study of Reflex Klystron as a Microwave source.
2. Study of Gunn Diode & PIN Modulator as a Microwave source.
   Study and Verification of Port Characteristics of Microwave Tees (E, H, E-H Planes).
3. Study and Verification of Port Characteristics of Directional Coupler.
4. Study and Verification of Port Characteristics of Isolator & Circulator.
5. Study and plot of V-I Characteristics of LED as a light source.
6. Study and Measurement of Numerical Aperture of a fiber.
7. Study and transmission of Analog/Digital Signals through a fiber optic link.
8. Measurement of attenuation of optical fiber cable of various lengths.
9. Study and plot the characteristics of a Light Detector.