SCHEME OF INSTRUCTION AND EXAMINATION
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
FINAL YEAR OF BACHELOR'S DEGREE COURSE
IN ELECTRONICS AND TELECOMMUNICATION

SEMESTER VII:

Subject Code	Subjects	Scheme Of Instruction			Scheme Of Examination					
					Th Dur (hrs)	Marks				
		L	T	P		Th	S	P	O/ SM	Total
ETC 7.1	Peripheral Devices & Interfacing	3	1	2	3	100	25	-	-	125
ETC 7.2	Microwave & Radar Engineering	3	1	2	3	100	25	-	50	175
ETC 7.3	Optical Fiber Communication	3	1	2	3	100	25	-	-	125
ETC 7.4	Elective I	3	1	2	3	100	25	-	50	175
ETC 7.5	Elective II	3	1	0	3	100	25	-	50	175
ETC 7.6	Project Seminar	0	0	1	-	-	25	-	50	075
		15	5	9	-	500	150	-	200	850

Semester VIII:

Subject Code	Subjects	Scheme of Instruction hrs/week			Scheme of examination					
					Th Dur (hrs)	Marks				
		L	T	P		Th	S	R	O	Total
ETC 8.1	Satellite & TV Engineering	3	1	2	3	100	25	-	50	175
ETC 8.2	Elective III	3	1	2	3	100	25	-	50	175
ETC 8.3	Elective IV	3	1	2	3	100	25	-	50	175
ETC 8.4	Project	-	-	10	-	-	25	50	50	125
		9	3	16	9	300	100	50	200	650

L - Lecture
T - Tutorial
R - Report
TH - theory
S - Sessionals
O/SM - Orals/Seminar
Th Dur (hrs) – Duration of theory paper in hours.

LIST OF ELECTIVES

ELECTIVE I	
SUBJECT CODE	**NAME OF THE SUBJECT**
ETC 7.4.1	**Operating Systems**
ETC 7.4.2	VLSI Technology & Design – I
ELECTIVE II	
ETC 7.5.1	Mobile Communication Systems
ETC 7.5.2	Artificial Neural Networks
ELECTIVE III	
ETC 8.2.1	Data Communication
ETC 8.2.2	Consumer Electronics
ETC 8.2.3	Optical Computing
ELECTIVE IV	
ETC 8.3.1	E-Commerce
ETC 8.3.2	Embedded Systems
ETC 8.3.3	Telecommunications Transmission System
ETC 8.3.4	Digital Image Processing

ETC 7.1 PERIPHERAL DEVICES & INTERFACING

Lectures per week	:4 hours
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2

Min. no of questions to be answered from each module :1
Total no. of questions to be answered in the paper :5

MODULE I

1. Input Output Organization
   --**Peripheral devices, input output interface, asynchronous data transfer, modes of transfer, priority interrupt, DMA, input output processor, serial communication.**
2. Interfacing Devices
   --Types of interfacing devices, address decoding for input/output, I/O ports, interfacing I/O ports [Steps in interfacing I/O devices, methods of interfacing I/O devices].
3. 8155 - Multipurpose Programmable Device
   --Block diagram, control logic, interfacing 8155 I/O ports, 8155 timer, 8155 ports in handshake mode.

MODULE II

1. 8255 - Programmable I/O Device
   --Block diagram, modes of operation, interfacing 8255.
2. 8259 - Programmable Interrupt Controller

--Block diagram, architecture and signal description, command, words, operating modes of 8259A, interfacing & programming of 8259A.

3. 8251 - Programmable Communication Interface - USART

Architecture and signal description, operating modes, command instruction format, interfacing & programming 8251 with 8086.

MODULE III

1. 8279 - Keyboard/Display Controller
   --Architecture & signal description, modes of operation, command words, interfacing &

   programming 8279.

2. 8253 - Programmable Interval Timer
   --Architecture & signal description, modes of 8253, Control word, programming & interfacing.
3. 8237 - Programmable DMA interface
   --Internal Architecture, Signal description, DMA operations with 8237, 8237 commands, programming & interfacing 8237 with 8086.

MODULE IV

1. 8272 - Floppy Disk Controller
   --Internal Architecture, Signal description, Functional details.

8275 - CRT Controller
--Internal Architecture, Signal description, Display formats & operational features.

2. Analog interfacing
   --Interfacing A/D Data converters, ADC 7109, interfacing 7109 with 8086 through 8255, DAC 0800, interfacing DAC 0800 with 8086.
3. Industrial Control
   --Temperature monitoring & control system, speed control of D.C. motors, firing of thyristor.
4. Interfacing buses
   IEEE 488 (GPIB) & RS - 232C

Textbooks:

1. Advanced Microprocessors & Peripherals by A.K.Ray & K.M.Bhurchandi
2. Computer System Architecture by Morris Mano

Reference books:

1. Microprocessors & interfacing by D.V.Hall
2. Microprocessors - Architecture, Programming & Applications by Ramesh Gaonkar
3. Introduction to Microprocessors by A.P. Mathur
4. Microprocessors - Principle & Applications by Ajit Pal.

ETC 7.2 MICROWAVE & RADAR ENGINEERING

Lectures per week	:(3+1) hours
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module:	1
Total no. of questions to be answered in the paper	:5

MODULE I

Fundamentals of microwave amplifiers & oscillators: Beam coupling, power transfer from alternating gap field to density modulated beam, beam loading, noise, microwave oscillators, analysis of two terminal oscillator circuits, build-up and limitation of amplitude of oscillation, admittance diagram for two terminal oscillator, admittance diagram for four terminal oscillators.

Klystron: Bunching by velocity modulation, velocity diagram (Applegate diagram), small signal theory of bunching two terminal klystrons.
Reflex Klystron: Structure, velocity diagram, bunching in Reflex Klystron, power delivered to the resonator, effect of the repeller voltage upon power delivered to the resonator, electronic admittance.

MODULE II

Traveling Wave Magnetron: Structure, modes of oscillation, mode separation by strapping.
Traveling Wave Tube: Construction and operation, slow wave circuits, backward wave oscillator.
Measurements: Calorimeter wattmeters, bolometers, bolometer bridges & mounts, thermocouples and crystals, measurement of standing waves, impedance measurement, measurement of frequency & wavelength, microwave bridges, measurement of Q (by transmission, VSWR measurement, decrement measurement), measurement of noise factor.
Microwave semiconductor devices: Microwave FET's, Tunnel diode, Gunn diode, Avalanche transit time devices: IMPATT & TRAPATT.

MODULE III

RADAR: Principle of operation of radar, maximum unambiguous range, radar range equation, Radar block diagram, radar frequencies, applications of radar, accuracy & resolution of radar, radar horizon, apparent range.
Receiver noise, signal to noise ratio, Probability of Detection & False Alarm, Integration of Radar Pulses.
Radar Cross Section: Radar Cross Section of Targets, Radar Cross section fluctuations, Swerling Target model
Transmitter power, pulse repetition frequency, system losses
Doppler frequency shift, Continuous wave Radar, FM-CW Radar
Clutter: Sea clutter, Weather clutter, other sources of atmospheric echoes
MTI Radar: Principle of operation, block diagram, single & double delay line cancellers, clutter attenuation, blind speeds, staggered PRF's, limitations to MTI performance, non-coherent MTI, MTI from a moving platform.
Radar displays: Plan Position Indicator (PPI)
Antenna for radars: Electronically Steered Phase Array Antenna, advantages of Phased Array Antenna, limitations

MODULE IV

TRACKING RADAR: Different methods of tracking, Sequential lobing, Conical Scanning, amplitude & phase comparison Monopulse Radar, limitations to tracking accuracy, low angle tracking, frequency agility

Tracking in Range: Split Gate Tracker, Precision on-axis tracking, track while scan, automatic tracking with surveillance radar
Radar signal Management, pulse compression, FM pulse compression radar, CHIRP, phase coding.

Radomes: Rigid radomes, air supported radomes, weather effects on radomes, radome wall construction, metallic radomes, rotodomes.

Secondary Surveillance Radar (SSR): Principle of operation, problems with SSR.
Principle of operation of the following radar :Over the horizon radar, surface wave radar, Sky wave radar, Synthetic Aperture Radar (SAR), ground probing radar, carrier free radar, battlefield radar, concept of bistatic & multistatic radar.

Textbooks:

1) Microwave Principles by H.J.Reich, J.G.Skolnik, P.F.Ordung, H.L.Krauss - Affiliated East West Press Ltd.
2) Introduction to Radar Systems (3rd Edition) by Merill Skolnik – Tata McGraw Hill,
3) Understanding Radar Systems by Simon Kingsley & Shaun Queegan – Standard Publisher Distributors, New Delhi

Reference books:

1) Microwave Devices & Circuits by S.Y.Liao – Prentice Hall of India
2) Microwaves by K.G.Gupta, Wiley Eastern Limited
3) Electronic & Radio Engineering by F.E.Terman – McGraw Hill Book Co. Ltd.
4) Foundations for Microwave Engineering by R.E.Collin, McGraw Hill Book Co.
5) Radar Engineering Handbook by McGraw Hill Book Co. Ltd.

ETC 7.3 OPTICAL FIBER COMMUNICATION

Lectures per week	:4 hours
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module	:1
Total no. of questions to be answered in the paper	:5

MODULE I

Introduction: Need for optical communication, block diagram of an optical communication system.
Optical fibers: Basic Optical Laws and definitions, Optical fiber modes and configurations, Mode theory for circular wave guides, graded index fiber structure, Overview of Fiber material and fiber fabrication.
Signal degradation in optical fibers: attenuation, Signal distortion in optical waveguides, Pulse broadening in graded index waveguides, mode coupling.

MODULE II

Optical Sources: Light-emitting diode structures, Light source material, Internal quantum efficiency, modulation capability, Transient response. Laser diode modes and threshold conditions, Resonant frequencies, Laser diode structures and Radiation Patterns, modulation of laser diodes, Temperature effects.

Power Launching and Coupling: Source to fiber power launching, Lensing schemes for coupling improvement, Fiber-to-fiber joints, Fiber splicing, optical fiber connectors

MODULE III

Photodetectors: Physical principles of photodiodes, Photodetector noise, Detector response time, Photodiode material

Optical Receiver Operation: Fundamental Receiver operation, Digital receiver performance calculation, Preamplifier types, Analog receivers.

MODULE IV

Unguided Optical Communication System: Transmission Parameters, Sources and Detectors, Examples of unguided optical communication systems.

Optical fiber communication systems: Digital optical fiber Telecommunication systems, Data Communication networks, Analog systems, the optical ether.

Textbooks:

1. Optical fiber communication by G. Keiser, McGraw Hill, 1983.
2. Optical communication system by J. Gowar

Reference books:

1. Optical fiber communication by Oselt, McGraw Hill, 1980.
2. Fiber optics by P.K. Cheo
3. Optical fibers by Okashi
4. An Introduction to optical fibers by H.A. Cherin, Mc Graw Hill, Book Co. 1983.

ETC 7.4.1 OPERATING SYSTEMS (ELECTIVE I)

Lectures per week	:(3+1) hours
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module:	1
Total no. of questions to be answered in the paper	:5

MODULE I

Introduction to Operating Systems: The computer as a tools for programmers and end-users, basic elements, processor registers, instruction execution, interrupts, memory hierarchy, cache memory, I/O communication techniques, operating system objectives and functions, evolution of operating system.

Process description & control: Process, process states, the creation and termination of processes, two and five process model, processor modes, suspended process, process description, operating system control structures, process control structures, process location, process attributes, process control.

Threads, SMP & Microkernels: Multithreading, thread functionality, thread states, thread synchronization, relationship between threads and processes, symmetric multiprocessing, SMP organization, Microkernels, study of WINDOWS NT thread and SMP management.

Scheduling: Typing of scheduling, scheduling algorithms, first come first served, round robin, shortest process, next, fair-share scheduling, multiprocessor scheduling, real time scheduling, study of WINDOWS NT scheduling.

MODULE II

Concurrency control: Principles of concurrency, operating system concerns, process interaction, competition amongst processes for resources, cooperation amongst processes by sharing and communication.

Mutual exclusion: Requirements of mutual exclusion, Dekker's Algorithm, Peterson's algorithm, interrupt disabling, machine instruction approach.

Semaphores: Mutual exclusion, producer/consumer problem, implementation of semaphores, A barbershop problem, monitors, monitor with signal, notify and broadcast, message passing, readers/writers problem.

Deadlock & Starvation: Principles of deadlock and starvation, conditions for deadlock, deadlock prevention, deadlock avoidance, deadlock detection, dining philosopher's problem, UNIX concurrency mechanism.

MODULE III

Memory: Memory management requirements, memory partitioning, paging, segmentation.

Virtual memory: Hardware & control structure, paging, segmentation, operating system software, fetch policy, placement policy, replacement policy, optimal, least recently used, first-in, first-out, clock algorithm for replacement, study of WINDOWS NT memory management.
I/O management & disk scheduling: I/O devices, organization of I/O function, operating system design issues, I/O buffering, disk scheduling, disk scheduling policies, RAID, disk cache.
File management: Files, file management systems, file organization and access, file directories, file sharing, record blocking, secondary storage management, study of WINDOWS NT file system.

MODULE IV

Distributed systems: Need for protocol architecture, TCP/IP protocol architecture, the OSI protocol architecture, client/server computing and applications, classes of client/server applications, middleware, distributed message passing, remote procedure calls, clusters, study of WINDOWS NT WOLFPACK.
Distributed process management: Process migration, distributed global states, distributed mutual exclusion, distributed queue, distributed deadlock, deadlock in message communication.
Security: Security threats, protection, intruders, intrusion techniques, password protection, password selection strategies, intrusion detection, viruses and related threats, trapdoors, logic bomb, Trojan horse, viruses, worms, bacteria, nature and types of viruses, anti-viruses approaches, trusted systems, network security, study of WINDOWS NT security.

Basics of cryptography: Encryption, data-encryption standard, public key encryption, Rivest-shamir-Adleman algorithm.
RISC: Basics of RISC approach, pipelined and super-scalar approaches, vector processors and parallel processors, concept of Von Neumann architecture.

Textbooks:

1. Operating systems: Internals & Design Principles by William Stallings, Prentice Hall Int.
2. The Architecture of Computer Hardware Systems Software: An Information Technology Approach by Irv Englander, John Wiley & sons.

Reference books:

1. Operating systems concepts by a. Silberschatz, P.Galwin, Addison Wesley.
2. Modern Operating Systems by Andrew Tanenbaum, Prentice Hall.
3. Operating Systems: Concepts and design by Milam Milenkovic, McGraw Hill.
4. Operating Systems: A Design oriented Approach by Charles Crowley, Tata Mc Graw Hill.
5. Inside Windows NT by David Solomon, Microsoft Press.

ETC 7.4.2 VLSI TECHNOLOGY AND DESIGN (ELECTIVE I)

Lectures per week	:4 hours
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25

Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module:	1
Total no. of questions to be answered in the paper	:5

MODULE I

Silicon semiconductor technology: Wafer processing, oxidation, epitaxy, deposition, ion-implantation and diffusion silicon gate process.

Basic CMOS technology: A basic n-well and p-well CMOS process. Silicon on insulator, MOSIS layout design rules (full-custom mask layout designs), stick diagrams, layout editors (Magic/Micro Wind) and circuit extraction.

MODULE II

MOS transistors: Structures, MOS system under external bias, operation of MOS transistor (MOSFET), threshold voltage, MOSFET current-voltage characteristics (CGA), channel length modulation, substrate bias effect, measurements of parameters – K_N, V_{TP} & γ, MOSFET.

Scaling – Full scaling & constant voltages scaling. Short channel effects, narrow channel effects, MOSFET capacitances.

Modeling of MOS transistor circuits using SPICE (level1 model equations)

MODULE III

MOS Inverters: Static Characteristics: VTC, noise immunity and noise margins, NMOS inverter, CMOS inverter (SPICE model) – circuit operation, calculation of V_{IL}, V_{IH} and V_{TH}, power and area considerations, CMOS latch-up and its prevention, CMOS logic circuits, CMOS transmission gate.

Cell based design methodology: Standard cell, Macrocell place and route.

Array based implementation approaches: Mask- programmable array, prewired Arrays (FPGA), Ram based (volatile FPGAs)

MODULE IV

VLSI design methodologies

VLSI design flow, design analysis, simulations: circuit, timing, switch-level, gate-level (or logic), functional – (using VHDL), Design verification: Electrical, timing, functional (formal), Implementation approaches: Custom circuit design, Design synthesis: Circuit and logic Synthesis, Validation and testing: Test procedure, Design for Testability (DFT) Scan – Based Test, Boundary- Scan Design, Built in self test (BIST), test-pattern generation, fault models, Automatic Test-Pattern generation (ATPG), Fault simulation.

Textbooks:

1. CMOS Digital Integrated Circuits (Analysis and Design) by Yusuf and Kong.
2. Principles of CMOS VLSI Design by Neil H.E. Weste, Kamran Eshranghian.
3. Digital Integrated Circuits – (Design perspective) by Jan M. Rabaey.

4. Fundamentals of Digital logic with VLSI design by Stephen Brown, Zvonco Vranesic

Reference books:

1. Basic VLSI Design by Douglas Pucknell, Kamran Eshraghian, PHI.
2. Modern VLSI design (Systems on Silicon) by Wayne Wolf.
3. Introduction to VLSI design by Eugene D. Gabricius.
4. VHDL by Douglas Perry.
5. VHDL Primer by J. Bhaskar.

ETC 7.5.1 MOBILE COMMUNICATION (ELECTIVE II)

Lectures per week	:4 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module:	1
Total no. of questions to be answered in the paper	:5

MODULE I

Introduction: Applications of mobile communication, frequencies used, basic cellular system and its operation, propagation attenuation, fading characteristics, delay spread and coherent bandwidth, propagation paths, cell shape, components of cellular systems.

Concept of frequency reuse channel, co-channel interface reduction factor, carrier to interference ratio of omni directional antenna system, hand off mechanism, cell splitting, analog cellular mobile: specifications of mobile station, specification of land station.

MODULE II

Mobile point-to-point model: Propagation over water, foliage loss, near-in distance and long distance propagation, path loss, cell site antenna height and signal coverage cells, mobile to mobile propagation.

Cell site mobile antennas: Gain and pattern relationship, sum and difference pattern and their synthesis, cell site antennas and their types, minimum separation of cell site receiving antennas, mobile antennas and their types.

MODULE III

Co-channel interference and its measurement, reduction of co-channel interference by notch in the tilted antenna pattern, power control, diversity receiver, adjacent channel interference, near-end-far-end interference, cross talk, SAT tone, UHF TV interference..

Definition of channel assignment, fixed channel assignment, channel sharing and borrowing, sectorization, non-fixed channel assignment algorithms.
Switching and traffic-types of switching need for cellular analog switching equipments and digital. Features of handling, MTSO interconnection.

MODULE IV

Medium access control: Drawbacks of CSMA-CD in wireless communications, use of SDMA, FDMA, TDMA, Fixed TDM, Classical ALOHA, Slotted ALOHA, CSMA, DAMA (Demand assigned multiple access), PRMA (Packer reservation multiple access), Reservation TDMA; MACA (Multiple access with collision avoidance), Polling, ISMA (Inhibit sense multiple access), CDMA, SAMA (Spread ALOHA multiple access)
Telecommunication Systems: GSM (Global system for mobile communication), mobile services, system architecture, radio interface, logical channel and frame hierarchy, protocols, localization and calling handover, security.
DECT – System architecture and protocol architecture, TETRA.

Books:

1. Mobile Cellular Telecommunication – Analog and Digital systems by William C. Y. Lee, Mc Graw Hill International.
2. Mobile Communication by Jochen Schiller, Pearson Education Asia.

ETC 7.5.2 ARTIFICIAL NEURAL NETWORK (ELECTIVE-II)

Lectures per week	:4 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module:	1
Total no. of questions to be answered in the paper	:5

MODULE I

Introduction: Introduction to neural networks, structure of biological neuron, Mc-Culloch Pitts neuron model, logic network realization by using Mc-Culloch Pitts neuron model, Neuron modeling for artificial neuron systems, Neural learning.
Single layer network: Perceptions, concept of linear seperatibility and non-linear separatibility, perception, training algorithms- Hebbian learning rule, perceptron learning rule, Delta learning rule, Widrow-Hoff learning rule, co-relation learning rules, winner take all & outstar learning rules, problems related to all learning rules.

MODULE II

Multilayer network I: Error back propagation algorithm or generalized delta rule, quick prop algorithm, setting of parameter values and design considerations, performance evaluation.
Multilayer network II: Adaptive multilayer network – network pruning algorithm, Marchands algorithm, neural tree, tiling algorithm & problems related to adaptive multiplayer network, prediction network, radial basis function and its applications, polynomial network.

MODULE III

Winner-Take-All network, minimum H.D. classifier, simple competitive learning algorithm, LQV algorithm, an adaptive resonance theory, topologically organized network – SOM, SOFM, Kohonens algorithms, Distance based learning, K-means clustering algorithms and problems.

MODULE IV

Hopefield network: Non-iterative procedures for association, Hopefield network, brain-state-in-a-box network & problems.
Applications of neural network.

Books:

1. Elements of artificial neural network by Malhotra, Mohan, Ranka, Penram Publications.
2. Introduction to Artificial neural network by Zurada, Jaico Publications.
3. Introduction to Artificial neural network by Patterson.

ETC 8.1 SATELLITE AND TELEVISION ENGINEERING

Lectures per week	:3 hours
Tutorials per week	:1 hours
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module	:1
Total no. of questions to be answered in the paper	:5

MODULE I

Satellite orbits and inclination: Synchronous orbit, orbital parameters, satellite location with respect to earth, look angles, earth coverage and slant range, eclipse effects, placement in geostationary orbit, station keeping, stabilization.

Satellite subsystems: Power, altitude and orbit control, propulsion, repeaters, antennas, Telemetry, Tracking & Command (TTC), thermal control, structure.
Earth station: Design requirements, subsystems, small earth stations, VSATs, mobile and transportable earth stations.
Applications: Communication, remote sensing, earth observation, meteorological, military and scientific & technological applications. Indian National Satellite Systems (INSAT).

MODULE II

Frequency allocations and spectrum.
Link design: Design equations, system noise temperature, C/N and G/T ratio, atmospheric and ionospheric effects, uplink design, complete link design, interference effects, earth station parameters.
Analog communication: FM/FDM techniques, S/N and C/N ratio, SCPC system, FM/FDM TV satellite link, intermodulation products.
Multiple Access Techniques: TDMA: Frame structure, burst structure, frame efficiency, super frame, frame acquisition and synchronization, comparison with FDMA, burst time plan, multiple beam (Satellite switched) system, beam hopping TDMA.
Demand Assignment Multiple Access Techniques: Erlang call congestion formula, DA-FDMA (Spade) system, DA-TDMA, digital speech interpolation.
Spread spectrum techniques and CDMA: Process gain, Jam margin, J/S ratio and antijam margin, Direct sequence spread spectrum, PN sequences, DS CDMA, frequency hopping system, FH-SS CDMA, Synchronization, Applications.

MODULE III

Basic television system: Sound and picture transmission, scanning methods, interlaced scanning, number of scanning lines, vertical and horizontal resolution, evaluation of bandwidth of baseband signal.
Television cameras: Principle of working and construction of Vidicon, CCD image sensors, colour television camera, gamma correction.
Composite video signal: Video signal levels, need for synchronization, details of synchronizing and equalizing pulses, scanning sequence details.
Signal transmission: AM and FM channel bandwidth, vestigial sideband transmission, VSB correction, television standards and their comparison (PAL, NTSC, SECAM), VHF and UHF bands.
Television transmission and relay system: Requirements of TV broadcast transmission, block diagram of a TV transmitter, visual and aural exciter, diplexer, microwave TV relay systems.
Studio equipment, organization and control: Technical facilities in television studios, television studios, production control room facilities, master control room equipment.
Signal reception: TV receiver block diagram, construction of picture tube and their control circuits, booster, balun, RF tuner, IF amplifier, IF response curve, Trap circuits, sync separators, video detector, AGC and AFC schemes, Audio detector, horizontal and vertical deflection systems, high and Extra High Tension (EHT) circuits.

MODULE IV

Colour television: Principles of additive and subtractive colour mixing, chromaticity diagram, compatibility, luminance, hue and saturation, luminance signal, generation of colour difference signal, polarity of colour difference signal.

Colour television display tubes: Delta gun picture tube, PIL picture tube, Trinitron picture tube, purity and convergence, static and dynamic convergence, automatic degaussing, grey scale tracking, pincushion distortion, S correction.

Colour signal transmission and reception: Frequency interleaving, bandwidth for colour signal transmission, modulation of colour difference signal, generation of chrominance signal.

NTSC colour TV system: I and Q signals, selection of colour subcarrier frequency,

NTSC encoder and decoder, limitation of NTSC system.

PAL colour television system: Main features of PAL system, cancellation of phase errors,

PAL encoder, PAL decoder, PAL-D.

SECAM colour television system: SECAM encoder and decoder block diagram.

Advanced television systems: HDTV systems, HDTV systems considerations, HDTV

standards and compatibility, NHK system, MUSE system.

Textbooks:

1. Satellite communication by D.C. Aggarwal, Khanna publications.
2. Electronic communication systems by W. Tomasi, Pearson Education, Asia.
3. Monochrome and colour television by R.R.Gulati, New Age International Pvt. Limited.
4. Television and Video Engineering by A.M.Dhake, Tata McGraw Hill publishing Company limited.

Reference books:

1. Satellite communication systems by Dennis Roddy, (third edition), Pearson Education, Asia.
2. Satellite communications by T. Pratt, C.W. Bostian, Wiley and sons.
3. Satellite communications, R.M. Gagliardi, CBS Publishers & Distributors, New Delhi
4. The satellite communication applications hand book by Bruce R.Elbert, Artech House Boston, 1997
5. Satellite communication systems engineering by Wilbur L.Pritchard, Hendri G.Suyderhood, Robert A.Nelson, II Edition, Prentice Hall, New Jersey.1993
6. Digital satellite communication by Tri T.Ha, 2nd edition, McGraw Hill, New york.1990
7. Digital communication satellite / earth station engineering by K.Feher, Prentice Hall Inc, New Jersey, 1983
8. Basic Television & video systems by Grob & Herndon, Glencoe Mc Graw Hill, 6th edition.

9. Television electronics – theory and servicing by Milton Kiver & Milton Kaufman, CBS publishers & distributors, New Delhi.
10. Colour television – theory & practice by R.R. Gulati, New Age International Ltd.
11. Colour television – theory & practice by S.P.Bali, Tata Mc Graw Hill.

ETC 8.2.1 DATA COMMUNICATION

Lectures per week	:4 hours
Practical per week	:2 hours
Max. Marks for theory paper	:100
Max. Marks for orals	:50
Max. Marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module	:1
Total no. of questions to be answered in the paper	:5

MODULE-I

Data communication: Components, basic concepts - Line configuration: point to point, multipoint; Topology - mesh, star, tree, bus, ring, hybrid; Access methods - command/response, interrupt-driven, Token passing, CSMA/CD; Transmission modes - simplex, half-duplex, full-duplex; Categories of networks - LAN, MAN, WAN.

The OSI Model: Layered Architecture, Functions of the layers. DTE-DCE interface, Modems: Role of modems, modem functions, operation of a modem, connecting modem to telephone line; Multiplexing: FDM, synchronous TDM, statistical TDM, WDM

MODULE-II

Data link control: Line Discipline, flow control, error control: ARQ, stop-and –wait ARQ, sliding window ARQ, Go-back-N ARQ, Selective-Reject ARQ.

Data link protocols - Asynchronous protocols: XMODEM, synchronous protocols - Character oriented protocols: Binary Synchronous Communication (BSC), Bit Oriented Protocols: SDLC, HDLC.

MODULE-III

Switching - Switching networks, Circuit switching: Space-Division switching, Time-Division switching, Packet switching: Datagram, Virtual Circuit [SVC, PVC], Message switching.

X.25: X.25 layers-Physical layer, frame layer, packet layer, PLP packets

MODULE-IV

Networking Devices: Repeaters, Bridges, Routers, Gateways.

Routing Algorithms: Distance Vector routing, link state routing, shortest path Algorithm-Flyod's Algorithm.
ATM: ATM Architecture-Virtual connection, Identifiers, Cells, Connection, Establishment & Release

ISDN: Integrated Digital network, ISDN, ISDN channels-B, D, H Channels, ISDN Interfaces, Functional grouping, ISDN protocol architecture- Physical layer, data link layer, network layer, ISDN addressing.

Text-books:

1. Data Communication & networking by Behrouz A. Forouzan, Tata Mc-Graw Hill [2nd edition].
2. Data & Computer Communications by William Stalling, PHI [5th edition].

Reference books:

1. Data Communications by William Schweber, McGraw Hill.
2. Design & Analysis of computer communications networks by Vijay Ahuja Mc-Graw Hill.
3. Data Communications & networks by Achyut S.Godbole Tata Mc. Graw Hill.

ETC 8.2.2 CONSUMER ELECTRONIC

Lectures per week	:3 hours
Tutorials per week	:1 hour
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module	:1
Total no. of questions to be answered in the paper	:5

MODULE I

Electro acoustical Transducers:
Microphones, Loudspeakers, Pick-up characteristics, specifications and applications.

Sound Recording and Reproduction:
Principle and block schematic of disc recording system, magnetic recording system, optical recording system, compact disc.

Audio Amplifier and subsystems:

Audio mixers, Tone controls, Graphic equalizers, Features of Hi-Fi and stereo systems, Dolby system, Public Address systems, Tuners

MODULE II

Testing, Alignment & Servicing of Television Receivers:
Testing & Alignment of TV Receivers, TV Wobbuloscope, Video Pattern Generators, Television Test Charts, Marker Generator, colour bar Generator, Colour Bar Pattern Generator, Vectoroscope**.**

CCTV system Feature:
Random Interlace, Video Camera signal processing, Single tube colour camera.
Cable Television:
Cable systems, Different frequency bands/Channels, Cable types and networks, Head End parameters, Trunk and cable distribution systems, scrambling and Conditional Access systems (CAS).
Satellite Television, Direct to Home TV
Digital Television:
Digital Television Systems, Digital TV signals, digitized Video parameters, Transmission of Digital TV Signals, Bit rate reduction.
Advanced TV systems**:**
Multiplexed Analog component Signals (MAC), D2-MAC/PACKET Signal, Advantages.
Projection Television: Basic Projection TV systems, Front & Rear projection, Schmidt Optical systems, LCD & Laser Projection systems.
High Definition Television Systems:
HDTV systems, HDTV standards & compatibility, MUSE system, HD-MAC Family, 3D Stereoscopic TV Techniques.

MODULE III

Principles of video recording:
Modes of recording, Conversion of analog audio and video signals to digital.
Modern home appliances with electronic control such as Microwave oven , Washing machines, DVD, MP3 player, digital camera, cordless phones, cell phones, remote controls for TV, Inverters, UPS
Working principle of photo copying and fax machine.

Maintenance and safety measures

MODULE IV

Marketing planning:
Importance of marketing planning, steps involved in the marketing planning process scanning the marketing environment and spotting the business opportunities, setting the market objectives

Marketing strategy:

The meaning and significance of marketing strategy, formulating the marketing strategy. Techniques and practices for mass production for reliable production

Costing:
Overview of costing and marketing communication**.**

Patents:
Introduction to patents

Textbooks:

1. Digital Consumer Electronics Engineering Handbook by Ronald Jurgen.
2. Audio Encyclopaedia by Triman
3. High quality sound recording and reproduction by Olson
4. Phillips handbook
5. Television Engineering by A. M. Dhake
6. Marketing management planning, implementation and control, 2nd edition by V S Ramaswamy, J Namakumari
7. Consumer Electronics by Gupta B R
8. Everything You Ever wanted to know about DVD by Jim Taylor

ETC 8.2.3 OPTICAL COMPUTING

Lectures per week	:3 hours
Tutorials per week	:1 hour
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module	:1
Total no. of questions to be answered in the paper	:5

MODULE I

Basic elements of optical systems-mirrors-gratings-lenses. Transducers-spatial light modulators-Holographic elements- Fundamental Limitations on dynamic range. Hybrid optical electronics systems. Dependence between optics and electronics.

MODULE II

Image spectral analysis and filtering-pattern recognitions. Picture debluring –synthetic aperture Radar imaging. Radio signal analysis-simple arithmetic, matrix operation- Differential and integration

MODULE III

Non –linear effects- optical bistability. Hybrid polarisation devices, optical phase conjugation. Passive and Active integrated optic devices

MODULE IV

Digital optical computers –Internal representation, implementation of binary logic elements, implementation of arithmetic units.
Memory – interconnection and communication –Architectures

Text Books:

1. Optical Computing by Dror G. Peitelsor
2. Digital Optical Computing proc. IEEE, VOL.72,1984
3. Non Linear Optics by G.P. Agarwal, Academic Press 1989

ETC 8.3.1 ELECTRONIC COMMERCE

Lectures per week	:4 hours
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module	:1
Total no. of questions to be answered in the paper	:5

MODULE I

Introduction to E-Commerce, benefits and limitations, types of E-Commerce. Reasons for going online, Internet and networking technologies, web browsers, introduction to HTML, XML, JavaScript, web application servers. Internet and network protocols. Web and database integration.

MODULE II

Security on the Internet. Threats and challenges on Internet, Secret key encryption, public key encryption, authentication, digital signatures, integrity, privacy on Internet, client based security, server based security, Secure Socket Layer (SSL), S-HTTP, Algorithms for security - RSA and DIFFIE-HELLMAN.

MODULE III

Electronic payment systems - limitations of traditional payment instruments, digital cash, electronic cheques, online credit card based systems, SET (Secure Electronic Transaction) protocol, debit cards, smart cards, preventing double spending.
Marketing strategies on the web, web design, attracting visitors, virtual societies, advertising, one-to-one marketing, direct marketing, choosing ISP.

MODULE IV

Supply chain management - Fundamentals, elements of supply chain management, managing retail supply chains, order management cycle.
Electronic Data Interchange (EDI), benefits of EDI.

Reference Books:

1. The E-business (R) evolution by Daniel Amor, Pearson education.
2. Electronic Commerce - A manager's guide by Ravi Kalakota, Andrew Whinston, Pearson education.
3. Web Commerce Technology Handbook by Daniel Minoli, Emma Minoli, Tata Mc Graw Hill.
4. Network Security - Private Communication in a Public world by Charlie Kaufman, Radia Perlman. Mike Speliner, Pearson education.
5. E-Commerce – Strategy, Technology and approaches by David Whiteley, Tata Mc Graw Hill.

ETC 8.3.2 EMBEDDED SYSTEMS

Lectures per week	:4 hours
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module	:1
Total no. of questions to be answered in the paper	:5

MODULE I

Different types of microcontrollers. Processor Architecture: Harvard and Princeton, CISC and RISC. The 8051 microcontroller architecture: Hardware, input/output pins, ports and circuits, external memory, counters and timers, serial data input and output, interrupts.
The 8051 instruction set: Data movement instruction: External Data move, Code memory Read-Only-Data moves, Push and Pop opcodes, Data exchanges. Logic operation: Bit and Byte level, Rotate and Swap.

MODULE II

The 8051 instruction set: Arithmetic operations: Flags, incrementing, decrementing, addition, subtraction, multiplication and division, decimal arithmetic. Jump instruction: call, subroutine Interrupts and Returns.
An 8051 Microcontroller design: A microcontroller design, testing the design, timing

subroutines, lookup tables for the 8051, serial data transmission

MODULE III

An 8051 microcontroller Applications:

-Interfacing of keyboard to 8051 based microcontroller system – Human factors, key switch factors, key configurations, programs for keyboards, a scanning program for small keyboards, interrupt-driven programs for small keyboards, program for a large matrix keyboard.

-Interfacing LED and LCD – Seven-segment numeric display, intelligent LCD display.

-Measurement of pulse width and frequency – Measuring frequency, pulse width measurement.

-Interfacing A/D and D/A Converter – D/A Conversions, A/D Conversions.

RTOS: Basics of real time operating systems, LCD Digital thermometer using RTOS.

MODULE IV

Introduction to PIC microcontrollers. CPU architecture and instruction set: Register file structure and addressing modes, CPU registers, instruction set, simple operations. Features of PIC microcontroller: Interrupt logic, IntService interrupt Service routine, loop time subroutine, RBO/INT external interrupt input, PORTB-Change Interrupts (Pins RB7:RB4), Timer 0,Timer 1, Timer 2, Pulse-Width-Modulated Outputs.I^2C Bus for serial EEPROM.

Text books:

1. The 8051 Microcontroller, Architecture, Programming & applications-second edition – Kenneth J. Ayala, Penram International.
2. Design with PIC Microcontrollers – John B. Peatman.

Reference books:

1. Programming and customizing the 8051 microcontroller – Myke Predko.
2. Programming and customizing PIC microcontrollers –Michael predko, Myke Predko.
3. PIC-micro microcontroller pocket reference.

ETC 8.3.3 TELECOMMUNICATIONS TRANSMISSION SYSTEM

Lectures per week	:3 hours
Tutorials per week	:1 hour
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module	:1
Total no. of questions to be answered in the paper	:5

MODULE I

Introduction to Telephone Communication Systems:

The functions of the telephone network, the telephone exchange control, transmission, network terminology, other uses of the telephone network.

Electronic Telephones:
An introduction to electronic telephones, a typical electronic telephone

An introduction to digital networks:
Evolution of digital networks, digital transmission, the introduction of the exchange control by digital computer, the introduction of digital switching, the integration of digital switching and transmission, the introduction of common channel signaling, digital transmission over the subscriber's line.

MODULE II

Common channel signaling:
Introduction to common channel signaling, the advantages of common channel signaling, common channel signaling systems, CCS terminology, correction of errors occurring in signaling units , structure of CCITT signaling system 7.
System X:
Introduction, system X local exchange, digital switching subsystem (DSS), other local exchange subsystems, synchronization, system X facilities.

MODULE III

Private digital telephone exchange systems:
Introduction to private systems, PBX architecture, basic PBX call processing.
Integrated services PBX (ISPBX):-
Voice and data switching on a single exchange, using an ISPBX
The digital transmission hierarchy:
The digital transmission network, digital multiplexing techniques, practical 2-8Mbit/s muldex, the trans multiplexer.

MODULE IV

Private Digital Networks:
Introduction to private integrated voice and data networks, private digital networks, the operations of DPNSS, DPNSS data calls, permanent data calls, centrex and virtual private networks.

WDM concepts and components, operation, fiber gratings, tunable Filters, Directional couplers, dispersion measurement, Optical Amplifiers – EDFA, Photonic Switching, Optical Network – SONET/SDII, optical Interference, ring topology, Star Architecture.

Textbooks:

1. Integrated Digital Networks by L.S. Lawton – Sigma Press, Wilmslow, England.

2. Optoelectronic – An introduction by J. Wilson, J.F.B. Hawkers , Prentice Hall of India Private Limited, New Delhi
3. Optical Fiber Communication by Gerd Keiser, Mc Graw Hill International Edition.
4. Semiconductor Optoelectronic Devices by Pallab Bhattacharya, Prentice Hall of India Private Limited, New Delhi

Reference Book:

1. Telecommunication Switching Systems and Networks – Thiagarajan**.**
2. Optical Communications – Components and systems by J.H. Franz and V.K.Jain – Narosa Publishing House**.**

ETC 8.3.4 DIGITAL IMAGE PROCESSING

Lectures per week	:3 hours
Tutorials per week	:1 hour
Practical per week	:2 hours
Max. marks for theory paper	:100
Max. marks for orals	:50
Max. marks for sessionals	:25
Duration of paper	:3 hours
Total no of modules	:4
No. of questions from each module	:2
Min. no of questions to be answered from each module	:1
Total no. of questions to be answered in the paper	:5

MODULE I

Introduction: Digital Image representation, elements of digital image processing systems, elements of visual perception, structure of human eye, MTF of the visual system, the visibility function light luminance, brightness, contrast, monochrome vision model, colour representation, sampling, 2-D sampling, linearity and space invariance, point spread function and convolution, 2-D Fourier Transform, image quantization, colour vision model, temporal properties of vision.

Statistical properties: Histogram, mean, standard deviation, profile of different distributions, stochastic characterization of images.

MODULE II

Image Transform: One and two dimensional DFT, the discrete cosine transform, Hadamard transform, the Karhuen – Loeve transform, Haar, Slant and SVD types, transform domain and recursive filtering techniques of processing.

Image Enhancement: Contrast enhancement, spatial and frequency domain methods, point operation, contrast stretching, bit extraction, range compression, Histogram equalization, modification local enhancement, image smoothing spatial operations, filtering multispectral,

image enhancement, intensity and log ratios principle components, Pseudo-colour image enhancement.

MODULE III

Image restoration: Sources of degradation, inverse and wiener filtering, removal of blur caused by motion spins, maximum entropy, restoration in spatial domain, geometric transformation, spatial transformation, recursive and non recursive techniques of restoration.

Image Analysis: Edge detection, spatial feature and boundary extraction, boundary representation, region representation structure, shape features, texture, scene matching and detection, image segmentation, classification, image understanding.

MODULE IV

Image coding and image compression:
Need and scope for image data compression, image quality and entropy considerations, pixel coding, PCM entropy coding, run-length coding, bit plane encoding, predicting techniques, DPCM, adaptive technique, transform coding, bit allocation, interframes coding, colour and multispectral image coding, JPEG and MPEG standards.

Feature coding: Luminance contour coding, edge coding, texture coding, SVD coding, JPEG and MPEG standards.

Applications of Image Processing: Character recognition, diagram understanding, fingerprint classification, face recognition.

Textbook:

1. Digital Image Processing by Gonzales & Woods, Addison Wesley, 1992.

Reference books:

1. Digital Image Processing by Pratt, Wiley Int., 1991.
2. Digital Image Processing by Ahmed, Mc Graw Hill, 1995