Dr. B.A.M.U. Aurangabad

Revised Structure of B.E. (Electronics/ Electronics & Telecommunication/ Industrial Electronics / Electronics and Communication)

Part-I

Sr. No.	Subject Code	Name of Subject	Teaching Scheme			Examination Scheme			
			Th.	Pr.	Total	PP	TW	Pr.	Total mark
01	EC4101	Computer Networks	04	02	06	100	--	50	150
02	EC4102	Embedded Systems	04	02	06	100	--	50	150
03	EC4103	Optical and Microwave Communications	04	02	06	100	--	50	150
04	EC4104	Voice Network(ECT)	04	02	06	100	25	--	125
05	EC4105	Advanced Digital Signal Processing (EC/IE)	04	02	06	100	25	--	125
06	EC4106	Telecommunication Networks and Management (Electronics & Communication)	04	02	06	100	25	--	125
07	EC4107	Elective-I	04	02	06	100	25	--	125
08	EC4108	Project Part-I	--	02	02	--	--	50	50
		Total	**20**	**12**	**32**	**500**	**50**	**200**	**750**

Elective –I

	ECT		**EC/IE**		**Electronics & Communication**
EC41071	Network Security	EC41074	Advanced Power Electronics	EC41077	Voice Network
EC41072	Digital Image Processing	EC41075	System Simulation and Analysis	EC41078	Information Security
EC41073	Artificial Neural Network& Fuzzy Logic	EC41076	Audio Video Engineering	EC41072	Digital Image Processing

Part-II

Sr. No.	Subject Code	Name of Subject	Teaching Scheme			Examination Scheme			
			Th.	Pr.	Total	PP	TW	Pr.	Total mark
01	EC4201	VLSI Design	04	02	06	100	--	50	150
02	EC4202	Audio Video Engineering (ECT)	04	02	06	100	--	50	150
03	EC4203	Digital Image Processing (EC/IE)	04	02	06	100	--	50	150
04	EC4204	Radar and Satellite Communications (ECT /Electronics & Communication)	04	02	06	100	--	50	150
05	EC4205	Robotics (EC/IE)	04	02	06	100	--	50	150
06	EC4206	Wireless Communication and Networks (Electronics & Communication)	04	02	06	100	--	50	150
07	EC4207	Elective-II	04	02	06	100	50	--	150
08	EC4208	Project Part-II	--	06	06	--	50	100	150
		Total	**16**	**14**	**30**	**400**	**100**	**250**	**750**

Elective –II

ECT		**EC/IE**		**Electronics & Communication**	
EC42071	Advanced Digital Signal Processing	EC42074	Network Security	EC42071	Advanced Digital Signal Processing
EC42072	Mobile Computing	EC42075	Systems Programming	EC42072	Mobile Computing
EC42073	Artificial Intelligence	EC42072	Mobile Computing	EC42073	Artificial Intelligence

EC4101 Computer Network

Teaching Scheme :
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. / Week

Exam Scheme :
Paper: 100 Marks
Practical: 50 Marks
Term Work: --

	Topics and Contents	Hours
1	**Introduction to Computer Networks :** Objective components of Communication Networks, topologies, centralized and distributed networks, LAN, MAN, WAN, Broadcast vs Point to Point networks, Overview of network model: ISO - OSI and TCP/IP. Network design issues, layered architecture, interfaces and services, service primitives and relationships of services to protocols.	06
2	**Physical Layer & Data Link Layer :** Communication Media: Twisted pair, coaxial cables, fiber optic cables, Wireless Communication. Design issues, framing, error detection and correction, CRC, Elementary protocols – stop and wait, Sliding window, Slip, bridges, circuit switching, message switching, packet switching network.	07
3	**Networks and Transport Layer :** Virtual circuits, and datagram networks, circuit switching, and packet switching. Routing algorithms, routers and routing protocols. Congestion control. Transport layer services and principles. Connectionless v/s connection oriented services like UDP and TCP, QOS (Quality of Services).	07
4	**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.	06
5	**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.	08
6	**Digital Networks:** Advantages, Signal conversion, digital carrier systems, ISDN, SIDN Channels, ISDN Layers, SBS, Integrated Networks, IEEE LAN Standards, IEEE 802 standards, IEEE 802.11 standards for wireless networks.	06

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.

Practical Examination :

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work :

Term work will consist of record of minimum 8 experiments out of the following list.

List of Experiments :

1. Study of TCP/IP & Internet
2. Study of LAN transmission medias, topologies, interconnection devices & LAN standards.
3. Study of LAN.
4. Write a program in C for PC to PC communication using RS232 port.
5. Study of errors & error correction Techniques.
6. Write a program for encryption & description using monoalphabetic substitution or polyalphabetic substitution.
7. Write a program to implement Huffman data compression algorithm to generate prefix codes & encoded text.
8. Study of web page design using HTML.
9. Study of sliding window protocol.
10. Study of FTP & SMTP.
11. Study of windows socket programming (UDP&TCP).

EC4102 Embedded Systems

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. / Week	Practical:	50 Marks
		Term Work:	--

	Topics and Contents	**Hours**
1	**Embedded system Introduction:** Introduction to Embedded System, History, Design challenges, optimizing design metrics, time to market, applications of embedded systems and recent trends in embedded systems, embedded design concepts and definitions, memory management, hardware and software design and testing, communication protocols like SPI, I2C, CAN etc	08
2	**System Architecture:** Introduction to ARM core architecture, ARM extension family, instruction set, thumb Instruction set, Pipeline, memory management, Bus architecture, study of on-chip peripherals like I / O ports, timers, interrupts, on-chip ADC, DAC, RTC modules, WDT, PLL, PWM, USB, I2C, SPI, CAN etc. Use 2148 /2368/2378 as reference micro-controllers	12
3	**Interfacing and Programming:** Basic embedded C programs for on-chip peripherals studied in system architecture. Need of interfacing, interfacing techniques, interfacing of different displays including Graphic LCD, interfacing of input devices including touch screen etc, embedded communication using SPI,I2C, GSM modem for AT command study etc.	10
4	**Real Time Operating System Concept:** Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, events, memory management, RTOS services in contrast with traditional OS. Introduction to Ucos II RTOS, study of kernel structure of Ucos II, synchronization in Ucos II, Inter-task communication in Ucos II, memory management in Ucos II, porting of RTOS.	10

Text/Reference Books:

1. Rajkamal - Embedded Systems, TMH.
2. David Simon - Embedded systems software primer, Pearson
3. Steve Furber - ARM System-on-Chip Architecture, Pearson
4. Jean J Labrose - MicroC / OS-II, Indian Low Price Edition
5. DR.K.V.K.K. Prasad - Embedded / real time system, Dreamtech
6. Iyer, Gupta - Embedded real systems Programming , TMH
7. Steve Heath - Embedded System Design , Neuwans
8. ARM System Developers Guide – Andrew Sloss

Practical Examination :

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work:

Term work will consist of record of minimum 8 experiments based on the syllabus.

EC4103 Optical and Microwave Communication

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. / Week	Practical:	50 Marks
		Term Work:	--

	Topics and Contents	**Hours**
1	**Introduction to OFC & its components :** Optical Fiber Communication system, Advantages over other communication systems . Ray theory , types of fibers, fiber materials, fiber fabrication (double crucible method) and their mechanical properties, Fiber cable, Basics of light sources (LED and LASER), light detectors (PIN and APD), Numericals based on above topics.	08
2	**Signal Degradation in Optical Fiber :** Various degradation mechanisms: Attenuation, Dispersion-Intermodal and Intra modal, Pulse broadening in GI fibers, Mode coupling, Coupling losses, Fiber splicing, connectorization, coupling methods and their losses, Numericals based on above topics.	06
3	**FOC System :** Analog: Overview of analog links, Digital: Point-to-point links, system consideration, Link power budget, Rise time budget, Wavelength Division Multiplexing, , Optical networks: SONET/SDH, Photonic switching and sensor applications,. OTDR (Principle, concept & applications) Numericals based on above topics	06
4	**Microwave Wave-guides and Components :** Rectangular wave-guide, Wave equation, 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.	08
5	**Microwave Tubes :** High frequency limitations of conventional vacuum tubes (triode, Tetrode, Pentode), 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.	06
6	**Solid-State Microwave Devices :** Principle of operation, construction, characteristics, parameters with analysis of Microwave transistor, Varactor Diode, Tunnel, PIN Diode, Gunn Diode.	06

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.

Practical Examination :

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work :

Term work will consist of record of minimum 8 experiments out of the following list.

List of Practicals

1. Study of transmission & reception of different types of signals (any two) through optical fiber.
2. Measurement of losses in optical fiber.
3. Measurement of numerical aperture.
4. Study of splicing & connectorization.
5. Application of optic fiber.
6. Study of microwave components.
7. To plot modes (characteristics) of reflex klystron.
8. Study of microwave Tee’s.
9. Measurement of Guide wavelength & guide frequency in rectangular waveguide.
10. Plot V/I characteristics of Gunn oscillator.

EC4104 Voice Network (ECT)

Teaching Scheme :		Exam Scheme :	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. / Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	Hours
1	**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)	06
2	**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.	06
3	**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.	08
4	**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.	07
5	**Code Division Multiple Access :** CDMA standards, IS-95 system architecture, Air Interface, Physical and logical channels of IS- 95, CDMA call processing, CDMA 2000 system	06
6	**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, Session Initiation Protocol (SIP)	07

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

Term work :

Term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.

EC4105 Advanced Digital Signal Processing (EC/IE)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	**Hours**
1	**Random Signals** Characterization of random signals: review of deterministic signals, random signals, correlation function, power spectra, DT random signals, time averages for DT random process. filters in sampling rate alteration systems, digital filter banks and their analysis and applications, multi level filter banks, estimations of spectra from finite – duration observation of signals. sample rate conversion using poly-phase filter structures, Efficient D/A conversion in Hi-Fi systems.	06
2	**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.	08
3	**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.	06
4	**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.	08
5	**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.	06
6	**Applications of DSP using MATLAB** Mobile communication, medical, image processing**,** Acoustic Noise Canceler, Dynamic range compression, LPC analysis and synthesis, SSB modulation, Radar tracking implementetion	06

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.
8. S.k mitra, "dsp"tmh
9. Mathworks manuals.
10. Applications to DSP Using Matlab by proakis

TERMWORK: Term work will consist of record of minimum 8 practicals out of the following using matlab.

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

Implementation of the following DSP Algorithms on DSP processors:

9. Implementation of FIR Filter.
10. Implementation of IIR Filter

EC4106 Telecommunication Networks And Management
(Electronics & Communication)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	**Hours**
1	**Introduction to switching and telecom networks :** Introduction to crossbar & electronics exchange, Types of networks, Network design issues, Design tools, switching technologies (circuit switching and packet switching)	06
2	**Broadband telecom networks :** ISDN, Basic structure, ISDN Interfacing & functions , transmission structure Protocol architecture, Narrow band & Broadband ISDN .	06
3	**Frame Relay & ATM :** Frame Relay introduction, Protocol, architecture frame, mode call control ,LAPF core Protocol, frame Relay congestion control. ATM, ATM Protocols, Public ATM networks, ATM cells their details and transmission, AAL, Traffic congestion and control.	08
4	**Broadband access And Routing technologies :** DSL, ADSL, Cable modems ,WLL, Optical wireless, Leased lines. Routing Algorithms for shortest path centralized routing, Distributed, Static and dynamic routing.	07
5	**QOS and Reliability Issues of telecom networks :** Delay, Jitter, Throughput/Bandwidth, Crosstalk/Interferance Issues, Network reliability and survivability Issues, Network protection mechanisms.	05
6	**Telcom network management :** Telcom 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.	08

Text Books:-

1. Aaron kershenbaumj "Telecommunication Networks Design Algorithms", MGH.
2. Mischa schwatriz, "Telecommunication Networks protocols modelling and analysis" Pearson Education
3. Data and computer communication – William stallings- PHI.
4. ISDN &Broadband ISDA with Frame Relay & ATM, - William stallings Pearson Education Asia 4th edition
5. Telecommunication Switching ,Traffic & networks-J.E.Flood, Pearson Education Asia 1st edition

Reference Books:-

1. Introduction to Telecommunications:Voice,data& internet- Pearson Education
2. OSS For telecom Networks By Kundan Mishra – Springer.
3. Telcommunication network and management – R.C. Jaiswal
4. Telecom technology by Tyagrajan vishwanathan –PHI
5. ATM Networks by Rainer handel Manfred N. Huber 3rd Edition 2001
6. Computer Networks by Andrew s. tanenbaum.

TERMWORK: Term work will consist of record of 08 experiments, and assessment will be based on

1. performing an experiment
2. Records of experiments submitted by the candidate.
3. Viva-voce on syllabus.

EC41071 Network Security (Elective-I for ECT)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	**Hours**
1	**Overview:** Fundamentals, Types, Standards, Foundations of Cryptography and Security, Approaches and techniques used, Encryption schemes, Mathematical tools for Cryptography.	07
2	**Designing:** Design issues, Cost justification and consideration, Design principle of Block Ciphers and Block Cipher Algorithms, Authenticating architectural design issues.	06
3	Digital signatures, Certificates and standards, setting and definitional issues, Length-restricted signature scheme, Constructions of signature schemes, planning techniques.	04
4	Electronic mail security, IP and Web security protocols, SSL and HTTP	04
5	**System security:** Computer Virus, Firewall and Intrusion detection, Electronic commerce security, Cyber laws related to E-commerce	07
6	**Maintenance:** Configuring secure access, Management, ongoing maintenance, standards development, ensuring site security.	06
7	**Results and Future directions:** Providing network security solutions for ISP Intranet, Internet and E-commerce, Enhancing Web server security, Wireless Network Security Solutions for consideration.	06

Text/Reference Books:

1. Stallings, William, " Cryptography and Network Security : Principles and Practice"
2. Vacca, " Guide to Wireless Network Security"
3. Menezes, Vanstone, " Handbook of Applied Cryptography"

TERMWORK: Term work will consist of record of minimum 8 experiments based on the syllabus.

EC41072 Digital Image Processing (Elective-I for ECT)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	**Hours**
1	**Digital Image Fundamentals :** Elements of visual perception, Image sampling & Quantization, Some basic relationships between pixels, colour fundamentals, colour models, pseudo colour image processing	04
2	**Image Enhancement :** Basic grey level transformations, histogram processing, enhancement using arithmetic and logic operations, spatial filtering – smoothing and sharpening filters. Smoothing and sharpening frequency domain filters	06
3	**Morphological Image Processing :** Neighbourhood concepts, adjacency and distance measures, dilation & erosion, opening & closing operations, basic morphological operations such as region filling, thinning, thickening, skeletons, pruning for binary and gray scale images.	06
4	**Image Segmentation :** Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, use of watersheds, image representation- chain codes, boundary descriptors & regional descriptors	08
5	**Image Transforms & compression :** Coding, interpixel and psychovisual image redundancy, fidelity criteria, Error free compression 2-D Discrete Fourier Transform, Discrete Cosine Transform – its application in Baseline JPEG , Walsh Hadamard Transform, Fast Walsh Transform, sub band coding Haar Transform – it's application as a Wavelet, multi resolution expansions, 1-D Wavelet Transform, Fast Wavelet Transform; Introduction to Gabor Transform, Introduction to Radon Transform	10
6	**Image Processing Applications :** Applications of transforms in fingerprinting, Medical applications such as tumour detection, Magnetic Resonance Imaging analysis using transforms, Morphological applications.	06

Text Books:

1. Gonzalez, Woods, 'Digital Image Processing' – PHI , 2nd edition
2. Milan Sonka 'Image Processing , Analysis & Machine Vision' Thomson Publication.

Reference Books:-

1. Pratt W.K. , ' Digital Image Processing', John Wiley, 2001

2. Jain A.K., ‘ Fundamentals of Digital Image Processing’, PHI, 1997

TERMWORK: Term work will consist of record of minimum 8 experiments out of the following list.

List of Practicals

1. Image negation, power Law correction
2. Histogram mapping & equalisation, stretching
3. Image smoothing , sharpening
4. Edge detection – use of Sobel, Prewitt and Roberts operators
5. Morphological operations on binary images
6. Morphological operations on Gray scale images
7. Pseudo coloring
8. Chain coding
9. Image statistics
10. DCT/IDCT computation
11. Transform application assignment.

Comments :

C / C++ and MATLAB may be used for the Practical

EC41073 Artificial Neural Networks and Fuzzy Logic (Elective-I for ECT)

Teaching Scheme :
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. /Week

Exam Scheme :
Paper: 100 Marks
Practical: --
Term Work: 25 Marks

	Topics and Contents	Hours
1	**Introduction** Biological Neural Networks, Characteristics of Neural Networks, Models of Neuron, Basic Learning Rules, Stability & Convergence	06
2	**Supervised Learning Neural Networks** Adaptive networks, Adaline and madaline, Single layer and multi layer perceptrons Radial basis function networks, Modular neural networks	06
3	**Feedback Neural Networks** Analysis of linear auto adaptive feed forward networks, Analysis of pattern storage Networks, Stochastic Networks & Stimulated Annealing, Boltzman machine	06
4	**Unsupervised Learning Networks** Competitive learning, Kohonen self-organizing maps, Learning vector quantization Principal component analysis of Hebbian Learning, Adaptive Resonance Theory	06
5	**Architectures For Pattern Recognition** Associative memory, Pattern mapping, Stability – Plasticity dilemma, ART, temporal patterns, Pattern visibility: Neocognitron	06
6	**Applications Of Neural Networks** Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decision making	05
7	**Fuzzy Set Theory** Introduction to Fuzzy Set with Properties, Fuzzy Relations, Fuzzy Arithmetic, Fuzzy Logic, Applications and Fuzzy Control	05

Text Books

1. B. Yegnanarayana, “Artificial Neural Networks”, PHI
2. James A Freeman, David M Skapura, “Neural Networks-Algorithms, Applications and Programming Techniques,” Person Education

Ref. Books

1. Haykin, “Neural Network a comprehensive Foundation”, PHI
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,” TMH
5. G. J. KLIR, B. Yuan, “Fuzzy Set Theory”, 1997 PHI.
6. W. Petryez “Fuzzy Sets Engineering” , CRL Press 1995.

TERMWORK: Term work will consist of record of minimum 8 experiments based on the syllabus.

EC41074 Advanced Power Electronics (Elective-I for EC/IE)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	**Hours**
1	**Power Electronics Converters:** Classification, Requirements of ideal switching devices. Three-phase cnverters:operation,overlap,p-pulse converters. Inverters: 120 and 180 mode operation for balanced R load. Voltage control of inverters. Performance parameters of converters and inverters.	06
2	**Resonant Converters:** Need of resonant converters: principle of resonant converter circuits :series and parallel. Classification: Load resonating converters, Resonating switch ZVS & ZCS converters, resonating dc link converters, resonating ac link converters. Design of resonant converter system. DC-DC Converter: Resonant pulse commutated chopper, Linear DC power supplies, DC-DC Converters with isolation.	08
3	**Choppers:** Step-down : Type A(1 quadrant),C(2 quadrant),E(4 quadrant) choppers. Chopper drive for separately excited DC motors, derivation of current ripple in the output of chopper. Source filter design.	04
4	**Speed control of separately excited DC motor:** Phase controlled converter; control circuit; control modeling of 3-phase converter; converter configuration for four quadrant DC motor; steady state analysis of 3-phase converter controlled DC motor drive. Speed controller design of PM Brushless DC motor; sensorless control.	08
5	**Control of Induction Motor:** Stator voltage control; static frequency changer ;VSI driven I.M. ; vector control scheme; tuning of vector controller; performance and application.	06
6	**Applications:** Disturbances in commercial power supplies: their types, Power Quality and power conditioners. Dual feeders with static transfer switches, EMI and Radio frequency interference and their suppression Transient suppression. UPS: Design of static UPS, Battery for UPS. Power factor correctors, PLC's, Industrial automation and Embedded systems.	08

Text/Reference books:

1. Modern Power Electronics, - P.C. Sen, S. Chand.
2. Electric Drives- Vedam Subrahmanyam, TMH
3. Power Electronics- Mohd. Rashid, PHI
4. Power Electronics- Jagannathan, PHI.

TERMWORK: Term work will consist of record of minimum 8 experiments out of the following list.

List of practical

1. Verify the input(R, V, I) –output (firing angle) characteristics of different firing circuits.
2. To plot firing angle V/S output voltage of three phase half/full converter with R and R-L load
3. Plot firing angle V/S RPM of 0.1 HP universal motor using TRIAC/SCR based control circuit.
4. Study operation of chopper drive.
5. To plot torque- speed characteristics of thyristor based I.M. drive with V/F constant.
6. Stepper motor drive.
7. Study of various parameters of UPS/SMPS.
8. Thyristor alarm circuits
9. Time delay relay circuits.
10. Case study: Industrial automation,
    PLC,
    Fire / security system.
11. Development of power Electronics system using embedded technique.

EC41075 System Simulation & Anyalsis (Elective-I for EC/IE)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. / Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	**Hours**
1	**Introduction:** System concepts ,system analysis, need for system analysis ,system simulation, system optimization	06
2	**System simulation:** Circuit simulation using LAB VIW,EDA tools, Multisim, PSPSICE, PSIM, MATLAB	10
3	**Time domain analysis:** Input output approach, discrete signal model, discrete time convolution, Response of linear discrete-time system, continuous(analog) signal model, continuous time convolution, response of linear continuous time system Analysis of linear systems with stochastic inputs, stochastic process characterization basic definition co relation function	08
4	Data analysis: Types of measured quantities central tendency of data, Estimation of true value of data measures of dispersion, standard deviation of the mean. Graphical representation of data: Equations of approximating curves, Graphical representation of functional relationships, Determination of parameters in linear relationships.	08
5	**Computer analysis tools:** General approach in computer problem solving, Logic analyzer, Spectrum analyzer, Debugging using emulator.	08

Text/Reference Books:

1. System Modeling & Analysis: I,J. Nagrath, M. Gopal (TMH)
2. Introductory Methods of Numerical Analysis: S.S. Sastry (PHI)
3. Instrumentation, Measurement and Analysis: Nakra, Chaudhary
4. Simulation, Madeling and Analysis: Law, Averill (TMH)

TERMWORK: Any eight experiments based on the syllabus.

EC41076 Audio Video Engineering (Elective-I for EC/IE)

Teaching Scheme :
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. / Week

Exam Scheme :
Paper: 100 Marks
Practical: --
Term Work: 25 Marks

	Topics and Contents	Hours
1	**Basic TV system:-** B/W TV system, scanning, composite video signal, TV standards, colour fundamentals, mixing of colours, chromaticity diagram, video signal for colour, luminance signal, colour difference signals, formation of chrominance signal.	06
2	**TV cameras & picture tubes:-** Vidicon, Plumbicon, Saticon, CCD image scanner, monochromatic picture tube, colour TV camera & picture tubes, Display devices-LCD,TFT etc.	06
3	**TV signal transmission & propagation:-** Propagation of TV signal, TV broadcast channels, TV transmission & reception antennas.	04
4	**Monochrome TV receiver:-** RF tuner, IF subsystem, video amplifier, sound section, Horizontal & vertical deflection circuits, functional requirement of receiver stages.	06
5	**Colour TV system:-** NTSC ,PAL, SECAM, Systems, (Encoder& decoder), Colour transmitter, Colour TV receiver.	04
6	**Allignment, testing & servicing of TV receivers:-** Study & use of swip generator, wobuloscope, pattern generator, test charts, field strength meter, Allignment & fault finding in TV receiver.	04
7	**Advanced Television Systems:-** 3D TV,HDTV, standards & systems, Digital TV ,Satellite TV,DTH TV, Video on demand, CCTV,CATV, Conditional Access systems,LCD TV,Mobile TV.	06
8	**Sound recording & reproduction:-** Magnetic recording,Optical recording,CD recording,CD,DVD, MP3 player, Audio Std.MPEG, PA system for auditorium, Cord less microphone system.	04

Text Book:-

1. Television & Video Engineering-A.M.Dhake,TMH Publication.
2. Monochrome & Colour TV-R.R.Gulati,Wuley Eastern publication.
3. Video Demisified –Kelth Jack, PI publication

Reference Book:-

1. Colour TV Theory & Practice –S.P.Bali, TMG Hill Publication.
2. Basic TV & Video Systems-Bernard Grobb.

Term work :

Term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.

EC41077 Voice Network (Elective-I for Electronics & Communication)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. / Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	**Hours**
1	**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)	06
2	**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.	06
3	**Optical Networks and Switching**: Optical links-WDM systems, cross connects, optical LAN's, optical paths and networks; TDS and SDS: modular switch designs-packet switching, distributed, shared, input and output buffers.	08
4	**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.	07
5	**Code Division Multiple Access :** CDMA standards, IS-95 system architecture, Air Interface, Physical and logical channels of IS- 95, CDMA call processing, CDMA 2000 system	06
6	**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, Session Initiation Protocol (SIP)	07

Text Books:

1. Vijay K. Garg, Joseph E Wilkes, "Principles & Applications of GSM", Pearson Education.
2. BehrouzA.Forouzan,”Data Communication and Networking”,Tata McGraw-Hill,New Delhi,2000.
3. 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

Term work :

Term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.

EC41078 Information Security (Elective-I for Electronics & Communication)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. / Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	**Hours**
1	**Information Security :** Attacks on information, components of Information Security, Cryptographic techniques, public & private key, mathematical tools of cryptography, Cryptography techniques, Authentication access control, Digital signature, Certificates & standards.	08
2	**Cypher Algorithm :** Design principles of block ciphers & Block Cipher Algorithms, Electronic mail security, RSA algorithm, MD5, IDEA, RC2, RC5 algorithm, Stenography techniques.	08
3	**Web Security :** SSL protocol security, HTTPS, WTLS protocol in WAP, Introduction to Web based bio AuC, issues of s/w piracy & copyright, Introduction to IT act 2000.	08
4	**Mobile Attacks:** 3 GPP security, Mobile Virtual Private n/w, Smart Card security, RFID security, Mobile Agent security, Mobile virus, mobile worms.	08
5	**Database Security systems :** Network security concept, Trojans, Intrusion detection, Firewall, Cyber law related to E-commerce.	08

Text/Reference Books :

1. Stallings, William- “Cryptography & n/w security. Principles & Practice”
2. Asoke K Talukder “ Mobile Computing”

Term work :

Term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.

EC41072 Digital Image Processing (Elective-I for Electronics & Communication)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	25 Marks

	Topics and Contents	**Hours**
1	**Digital Image Fundamentals :** Elements of visual perception, Image sampling & Quantization, Some basic relationships between pixels, colour fundamentals, colour models, pseudo colour image processing	04
2	**Image Enhancement :** Basic grey level transformations, histogram processing, enhancement using arithmetic and logic operations, spatial filtering – smoothing and sharpening filters. Smoothing and sharpening frequency domain filters	06
3	**Morphological Image Processing :** Neighbourhood concepts, adjacency and distance measures, dilation & erosion, opening & closing operations, basic morphological operations such as region filling, thinning, thickening, skeletons, pruning for binary and gray scale images.	06
4	**Image Segmentation :** Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, use of watersheds, image representation- chain codes, boundary descriptors & regional descriptors	08
5	**Image Transforms & compression :** Coding, interpixel and psychovisual image redundancy, fidelity criteria, Error free compression 2-D Discrete Fourier Transform, Discrete Cosine Transform – its application in Baseline JPEG , Walsh Hadamard Transform, Fast Walsh Transform, sub band coding Haar Transform – it's application as a Wavelet, multi resolution expansions, 1-D Wavelet Transform, Fast Wavelet Transform; Introduction to Gabor Transform, Introduction to Radon Transform	10
6	**Image Processing Applications :** Applications of transforms in fingerprinting, Medical applications such as tumour detection, Magnetic Resonance Imaging analysis using transforms, Morphological applications.	06

Text Books:

1. Gonzalez, Woods, 'Digital Image Processing' – PHI , 2nd edition
2. Milan Sonka 'Image Processing , Analysis & Machine Vision' Thomson Publication.

Reference Books:-

1. Pratt W.K. , ' Digital Image Processing', John Wiley, 2001
2. Jain A.K., ' Fundamentals of Digital Image Processing', PHI, 1997

TERMWORK: Term work will consist of record of minimum 8 experiments out of the following list.

List of Practicals

1. Image negation, power Law correction
2. Histogram mapping & equalisation, stretching
3. Image smoothing , sharpening
4. Edge detection – use of Sobel, Prewitt and Roberts operators
5. Morphological operations on binary images
6. Morphological operations on Gray scale images
7. Pseudo coloring
8. Chain coding
9. Image statistics
10. DCT/IDCT computation
11. Transform application assignment.

Comments :

C / C++ and MATLAB may be used for the Practical

EC4108 Project Part-I

Practical: 2 Hrs. /Week Practical Exam: 50 Marks

The project work will be carried out by a batch of at the most 3 students (preferably 2 students) working on a topic related to the electronics and allied fields. The topic may be from one of the following.

1. Laboratory work involving constructional theoretical and design aspects of the project/ system.
2. Modification aspect of an existing electronics systems.
3. It can be practical need of the industry, which should involve system design aspect.
4. Survey of latest development in Electronics and allied fields.

It shall consist of the term work in the form of hand written typed report not less than 25 pages. This should include the literature survey technical details related data that is collected & design that are required for project work part-I.

The candidate shall give a seminar on the subject chosen above in the presence of Guide and External examiner preferably from industry or the university.

Part -II

EC4201 VLSI Design

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	50 Marks
		Term Work:	--

	Topics and Contents	**Hours**
1	**MOS Devices :** Introduction to MOST, I – V Characteristics of NMOS and PMOS, Second order effects – CLM, Body bias, Short Channel Effects – VT roll off, DIBL, Mobility Degradation, Transfer Characteristics Of CMOS Inverter, Detailed analysis of CMOS Inverter with parasitics	06
2	**CMOS Design** CMOS logic families - static, dynamic including their timing analysis and power consumption, CPL, Pass Transistor Logic, Transmission gate, Circuits using CPL and Pass transistor logic	08
3	**Fabrication And Layout :** Basic CMOS Technology: Self aligned CMOS process, N well, P well, Twin tub, Layout of CMOS Inverter, Design rules, Verification of Layout	06
4	**Introduction To VHDL** Introduction, EDA Tool- VHDL, Design flow, Introduction to VHDL, Elements of VHDL, Modeling styles: Sequential, Structural and data flow modeling, sequential and concurrent statements	06
5	**Circuit Design Using FPGA & CPLD** Function, procedures, Attributes, Test benches, synthesizable and Non-synthesizable statements, Packages and configurations, The State diagram, Modeling in VHDL with examples such as counters, Registers and Bidirectional bus. Introduction, study of Architecture of CPLDs and FPGAs.	08
6	**Testability** Need of Design for testability, introduction to fault coverage, Testability, Design-for –testability, controllability and absorbability, 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	08

Text Books

1. N. Weste and K. Eshranghian, Principles of CMOS VLSI Design, Addison Wesley.
2. J. Rabaey, Digital Integrated Circuits: A Design Perspective, Prentice Hall India, 1997.
3. D. Perry, VHDL, 2nd Ed., McGraw Hill International, 1995.
4. Kang S. M.,CMOS Digital Integrated Circuits,TMH 3rd 2003
5. Bushnell Agrawal Essentials of Electronic Testing for digital memory and mixed signal VLSI circuits, Kulwar Academec Publisher

Reference Books

1. Boyce and Baker “CMOS” EEE Press.

2. Xilinx FPGA /CPLD Data Book

3. VHDL Primer Addison Wesley Longman,2000,J Bhaskar

Practical Examination :

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work :

Term work will consist of record of minimum 8 experiments based on the syllabus.

EC4202 Audio Video Engineering (ECT)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. / Week	Practical:	50 Marks
		Term Work:	--

	Topics and Contents	**Hours**
1	**Basic TV system:-** B/W TV system, scanning, composite video signal, TV standards, colour fundamentals, mixing of colours, chromaticity diagram, video signal for colour, luminance signal, colour difference signals, formation of chrominance signal.	06
2	**TV cameras & picture tubes:-** Vidicon, Plumbicon, Saticon, CCD image scanner, monochromatic picture tube, colour TV camera & picture tubes, Display devices-LCD,TFT etc.	06
3	**TV signal transmission & propagation:-** Propagation of TV signal, TV broadcast channels, TV transmission & reception antennas.	04
4	**Monochrome TV receiver:-** RF tuner, IF subsystem ,video amplifier, sound section, Horizontal & vertical deflection circuits, functional requirement of receiver stages.	06
5	**Colour TV system:-** NTSC ,PAL, SECAM, Systems, (Encoder& decoder), Colour transmitter, Colour TV receiver.	04
6	**Allignment, testing & servicing of TV receivers:-** Study & use of swip generator, wobuloscope, pattern generator, test charts, field strength meter, Allignment & fault finding in TV receiver.	04
7	**Advanced Television Systems:-** 3D TV,HDTV, standards & systems, Digital TV ,Satellite TV,DTH TV, Video on demand, CCTV,CATV, Conditional Access systems, LCD TV, Mobile TV.	06
8	**Sound recording & reproduction:-** Magnetic recording, Optical recording, CD recording, CD, DVD, MP3 player, Audio Std.MPEG, PA system for auditorium, Cord less microphone system.	04

Text Book:-

1. Television & Video Engineering-A. M. Dhake, TMH Publication.
2. Monochrome & Colour TV-R. R. Gulati, Wuley Eastern publication.
3. Video Demisified –Kelth Jack, PI publication

Reference Book:-

1. Colour TV Theory & Practice –S.P.Bali, TMG Hill Publication.
2. Basic TV & Video Systems-Bernard Grobb.

Practical Examination :

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work :

Term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.

EC4203 Digital Image Processing (EC/IE)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	50 Marks
		Term Work:	--

	Topics and Contents	**Hours**
1	**Digital Image Fundamentals :** Elements of visual perception, Image sampling & Quantization, Some basic relationships between pixels, colour fundamentals, colour models, pseudo colour image processing	04
2	**Image Enhancement :** Basic grey level transformations, histogram processing, enhancement using arithmetic and logic operations, spatial filtering – smoothing and sharpening filters. Smoothing and sharpening frequency domain filters	06
3	**Morphological Image Processing :** Neighbourhood concepts, adjacency and distance measures, dilation & erosion, opening & closing operations, basic morphological operations such as region filling, thinning, thickening, skeletons, pruning for binary and gray scale images.	06
4	**Image Segmentation :** Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, use of watersheds, image representation- chain codes, boundary descriptors & regional descriptors	08
5	**Image Transforms & compression :** Coding, interpixel and psychovisual image redundancy, fidelity criteria, Error free compression 2-D Discrete Fourier Transform, Discrete Cosine Transform – its application in Baseline JPEG , Walsh Hadamard Transform, Fast Walsh Transform, sub band coding Haar Transform – it's application as a Wavelet, multi resolution expansions, 1-D Wavelet Transform, Fast Wavelet Transform; Introduction to Gabor Transform, Introduction to Radon Transform	10
6	**Image Processing Applications :** Applications of transforms in fingerprinting, Medical applications such as tumour detection, Magnetic Resonance Imaging analysis using transforms, Morphological applications.	06

Text Books:

1. Gonzalez, Woods, 'Digital Image Processing' – PHI , 2nd edition
2. Milan Sonka 'Image Processing , Analysis & Machine Vision' Thomson Publication.

Reference Books:-

1. Pratt W.K. , ' Digital Image Processing', John Wiley, 2001
2. Jain A.K., ' Fundamentals of Digital Image Processing', PHI, 1997

Practical Examination :

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

TERMWORK: Term work will consist of record of minimum 8 experiments out of the following list.

List of Practicals

1. Image negation, power Law correction
2. Histogram mapping & equalisation, stretching
3. Image smoothing , sharpening
4. Edge detection – use of Sobel, Prewitt and Roberts operators
5. Morphological operations on binary images
6. Morphological operations on Gray scale images
7. Pseudo coloring
8. Chain coding
9. Image statistics
10. DCT/IDCT computation
11. Transform application assignment.

Comments :

C / C++ and MATLAB may be used for the Practical

EC4204 Radar and Satellite Communications
(ECT/Electronics & Communication)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	50 Marks
		Term Work:	--

	Topics and Contents	**Hours**
1	**Introduction to Radar** Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies –Applications of Radar – The Origins of Radar The Radar Equation Introduction- Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio-Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets- Radar cross Section Fluctuations- Transmitter Power-Pulse Repetition Frequency- Antenna Parameters-System losses – Other Radar Equation Considerations	06
2	**MTI and Pulse Doppler Radar** Introduction to Doppler and MTI Radar- Delay –Line Cancelers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - Limitations to MTI Performance - MTI from a Moving Platform (AMIT) - Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics -Comparison of Trackers - Automatic Tracking with Surveillance Radars (ADT).	06
3	**Detection of Signals in Noise** Introduction – Matched –Filter Receiver –Detection Criteria – Detectors –- Automatic Detector - Integrators - Constant-False-Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction -Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas – Phase Shifters -Frequency- Scan Arrays Radar Transmitters - Introduction – Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources - Other aspects of Radar Transmitter. Radar Receivers - The Radar Receiver - Receiver noise Figure - Superheterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.	06
4	**Overview Of Satellite Systems, Orbits And Launching Methods** Introduction – Frequency Allocations for Satellite Services – Intelsat – U.S.Domsats – Polar Orbiting Satellites – Problems – Kepler's First Law – Kepler's Second Law – Kepler's Third Law – Definitions of Terms for Earth-orbiting Satellites – Orbital Elements – Apogee and Perigee Heights – Orbital Perturbations Effects of a Nonspherical Earth – Atmospheric Drag – Inclined Orbits – Calendars – Universal Time – Julian Dates – Sidereal Time – The Orbital Plane – The Geocentric-Equatorial Coordinate System – Earth Station Referred to the IJK Frame – The Topcentric-Horizon Co-ordinate System – The Sub-satellite Point – Predicting Satellite Position.	08
5	**Geostationary Orbit & Space Segment**	06

Introduction – Antenna Look Angels – The Polar Mount Antenna – Limits of Visibility – Near Geostationary Orbits – Earth Eclipse of Satellite – Sun Transit Outage – Launching Orbits – Problems – Power Supply – Attitude Control – Spinning Satellite Stabilization – Momentum Wheel Stabilization – Station Keeping – Thermal Control – TT&C Subsystem – Transponders – Wideband Receiver – Input Demultiplexer – Power Amplifier – Antenna Subsystem – Morelos – Anik-E – Advanced Tiros-N Spacecraft

6 **Earth Segment & Space Link** 08

Introduction – Receive-Only Home TV Systems – Outdoor Unit – Indoor Unit for Analog (FM) TV – Master Antenna TV System – Community Antenna TV System – Transmit-Receive Earth Stations – Problems – Equivalent Isotropic Radiated Power – Transmission Losses – Free-Space Transmission – Feeder Losses – Antenna Misalignment Losses – Fixed Atmospheric and Ionospheric Losses – Link Power Budget Equation – System Noise – Antenna Noise – Amplifier Noise Temperature – Amplifiers in Cascade – Noise Factor – Noise Temperature of Absorptive Networks – Overall System Noise Temperature – Carrier-to-Noise Ratio – Uplink – Saturation Flux Density – Input Back Off – The Earth Station HPA – Downlink – Output Back off – Satellite TWTA Output – Effects of Rain – Uplink rain-fade margin – Downlink rain-fade margin – Combined Uplink and Downlink C/N Ratio – Intermodulation Noise.

Text/Reference Books:

1. George Kennedy, Electronic Communication Systems, Tata McGraw Hill.
2. Taub and Schilling , Principles of Communication, Tata Mc Graw Hill
3. Satellite Communication by Gagliardi, Robert M.
4. Satellite Communication by Agrawal D.C.
5. Electronic Communication Systems, Blake
6. Antenna and Wave Propagation , K.D.Prasad

Practical Examination :

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work :

Term work will consist of record of minimum 8 experiments based on the syllabus.

EC4205 Robotics (EC/IE)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	50 Marks
		Term Work:	--

	Topics and Contents	**Hours**
1	**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.	08
2	**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.	10
3	**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.	08
4	**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.	08
5	**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.	06

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 Examination :

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work :

Term work will consist of record of minimum 8 experiments out of the following list

List of Practicals:

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)

EC4206 Wireless Communication & Networks
(Electronics & Communication)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	50 Marks
		Term Work:	--

	Topics and Contents	**Hours**
1	**Introduction of wireless communication :** Overview, evolution of cellular system, Cellular system architecture & operation, Performance criteria. Multiple access schemes for wireless communication -TDMA, FDMA, CDMA, SDMA	05
2	**Wireless Network Planning And Operation :** frequencies management, channel assignments, frequency reuse, System capacity& its improvement, Handoffs & its types, roaming, co channel & adjacent channel interference .	10
3	**Digital cellular networks:** GSM architecture& interfaces, signal processing in GSM, frame structure of GSM, Channels used in GSM.	05
4	**Wireless LAN Technology :** Overview, WLAN technologies, infrared LANs, Spread Spectrum LANs Narrowband Microwave LANs IEEE 802.11- Architecture, protocols, MAC layer .MAC frame, MAC management,	05
5	**Bluetooth :** Overview, Radio specification, Base band specification, Link manager specification, logical link control & adaptation protocol.	05
6	**Mobile data networks:** Introduction, Data oriented CDPD networks, GPRS	05
7	**Wireless Access Protocol :** WAP architecture , Wireless Datagram ,Wireless Transport layer security, wireless transaction ,Wireless Session ,Wireless Application Environment ,WML	05

Text Books : 1. Mobile communication Engg- Lee W.C.Y

2. Wireless Communication, principles & practice-T.S.Rappaport

3. Mobile communication", Pearson Education- Schiller

Reference Books:

1. Wireless Communication & networking-William Stalling

2. Mobile communication –Rampantly

3. Wireless digital communication", PHI, 1999- Kamilo Feher

4. Principles of Wireless networks-Kavesh pahlavan & P.Krishna Murthy

Practical Examination: Practical Examination will be of 3 hrs duration. It Will consist of one experiment conducted during the course and oral exam based on syllabus.

TERMWORK: Term work will consist of record of minimum 08 experiments on the syllabus

EC42071 Advanced Digital Signal Processing (Elective-II for ECT)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	50 Marks

	Topics and Contents	**Hours**
1	**Random Signals** Characterization of random signals: review of deterministic signals, random signals, correlation function, power spectra, DT random signals, time averages for DT random process. filters in sampling rate alteration systems, digital filter banks and their analysis and applications, multi level filter banks, estimations of spectra from finite – duration observation of signals. sample rate conversion using poly-phase filter structures, Efficient D/A conversion in Hi-Fi systems.	06
2	**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.	08
3	**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.	06
4	**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.	08
5	**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.	06
6	**Applications of DSP using MATLAB** Mobile communication, medical, image processing**,** Acoustic Noise Canceler, Dynamic range compression, LPC analysis and synthesis, SSB modulation, Radar tracking implementetion	06

Text Books:-

1. E. C. Ifleachor and B. W. Jervis, “Digital Signal Processing- A Practical Approach”, 2nd Edition, Pearson education.
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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.
8. S.k mitra, "dsp"tmh
9. Mathworks manuals.
10. Applications to DSP Using Matlab by proakis

TERMWORK: Term work will consist of record of minimum 8 practicals out of the following using matlab.

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

Implementation of the following DSP Algorithms on DSP processors:

9. Implementation of FIR Filter.
10. Implementation of IIR Filter

EC42072 Mobile Computing (Elective-II for ECT)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	04 Hrs. / Week	Paper:	100 Marks
Practical:	02 Hrs. /Week	Practical:	--
		Term Work:	50 Marks

	Topics and Contents	**Hours**
1	**Communication Architecture.** Principle of Wireless Communication, Overview 1G,2G,2.5G,3G and 4G technologies, Introduction to CT2, DECT, PHS, PACS,GSM, GPRS, ATM, CDMA, GSM architecture, signaling techniques in network ,GSM mobility management and Handoff management, challenges of mobile computing, Cellular system & related concepts.	10
2	**Protocol Architecture:** CDPD, VoIP, GPRS services, WLL system, IPv6 & its application in mobile computing.	08
3	**Wireless Application Protocol (WAP)** WAP environment & architecture, protocol & its application, Micro browser, WAP security, Wireless Telephony application, WAP gateways, & WAP strategies. Fundamentals of WML, writing and formatting text, Navigation between cards and Decks, Displaying images, Tables, Using variables, acquiring user input.	10
4	**Cellular Technologies:** Overview of Spread Spectrum, Bluetooth scenario, architecture, various layers of Bluetooth & link manager protocol, IEEE 802.11 network topology, Adhoc network MAC & its management. HIPERLAN & its types, HIPERLAN2 & its features.	08
5	**Distributed Mobile Computing:** Distributed OS & file system, Mobile computing software (pervasive computing), Data management for mobile computing.	04

Text/Reference Books :

1. Yi Bing Lin, “Wireless and Mobile Networks Architecture”, John Wiley.
2. Schiller, “Mobile Communication” Pearson Education.
3. Sandeep Singhal, Thomas Bridgman, “ Wireless Application Protocol”,Pearson Education
4. Asoke K Talukder -“ Mobile Computing”TMH.
5. Wrox “ The Beginning WML and WML Script” Wrox Publication.
6. Jochen Burkhardt, et.al. Pervasive Computing, Technology and Architecture of Mobile Internet Applications, Addison Wesley,2002.

TERMWORK: Term work will consist of record of minimum 08 experiments on the syllabus

EC42073 Artificial Intelligence (Elective-II for ECT)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	50 Marks

	Topics and Contents	Hours
1	**Introduction To Artificial Intelligence** Definition, AI Applications, AI representations, properties of internal representations Heuristic Search Techniques, Best File Search, Mean and End Analysis, A* and AO* Algorithms	07
2	**Game Playing & Predicate Logic** Minimax search procedure, Alpha-beta cut-offs, Waiting for Quiescence, Secondary Search, Predicate Calculus, Predicate and arguments, ISA Hierarchy, Frame Notation, Resolution, Natural Deduction	07
3	**Knowledge Representation Using Non-Monotonic Logic** Truth Maintenance System, Statistical and Probabilistic Reasoning, Semantic-net Frames, Script, Conceptual Dependancy.	07
4	**Planning** Block world, strips, Implementation using goal stack, Non-linear planning using goal stacks, Hierarchical planning, List commitment strategy	07
5	**Neural Networks** Learning by training neural networks, Introduction to neural networks, Neural net architecture & applications, Natural language processing & understanding & paragmatic, Syntactic, Semantic, Qualities, finite state machines, RTN, ATN, understanding sentences	07
6	**Expert Systems** Utilization and functionality, Architecture of expert systems, Knowledge representation, Two case studies on expert systems	07

Text Books

1. Elain Rich and Kerin Knight, “Artificial Intelligance”

Reference Books

1. Eugane. Charniak, Frew, “Introduction to Artificial Intelligance”, McDermott
2. Kishan Mehrotra, Sanjay Rawika, K. Mohan, “Arificial Neural Network”
3. Rajendra Akerkar, “Introduction to Artificial Intelligance”, Prentice Hall Publication

TERMWORK: Term work will consist of record of minimum 08 experiments out of the following list

List of Practicals

1. Implement the game ‘Tic-Tac-Toe’ by using intelligent algorithm (or magic square method)
2. Implement A* algorithm to solve the problem of 8-puzzle (consider any initial state and final state)
3. Shoe the working of A0 algorithm
4. Implement the game using 8 tile puzzle using depth first search technique
5. Implement the game using 8 tile puzzle using Bredth first search technique
6. Implementation of simple neural network architecture for any pattern recognition application.
7. Implement the prolog for Family history management
8. Implement the authentication program
9. Implement the program for graphics (Individual)
10. Implement the expert system (Mini project : Group task)

EC42074 Network Security (Elective-II for EC/IE)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	50 Marks

	Topics and Contents	**Hours**
1	**Overview:** Fundamentals, Types, Standards, Foundations of Cryptography and Security, Approaches and techniques used, Encryption schemes, Mathematical tools for Cryptography.	07
2	**Designing:** Design issues, Cost justification and consideration, Design principle of Block Ciphers and Block Cipher Algorithms, Authenticating architectural design issues.	06
3	Digital signatures, Certificates and standards, setting and definitional issues, Length-restricted signature scheme, Constructions of signature schemes, planning techniques.	04
4	Electronic mail security, IP and Web security protocols, SSL and HTTP	04
5	**System security:** Computer Virus, Firewall and Intrusion detection, Electronic commerce security, Cyber laws related to E-commerce	07
6	**Maintenance:** Configuring secure access, Management, ongoing maintenance, standards development, ensuring site security.	06
7	**Results and Future directions:** Providing network security solutions for ISP Intranet, Internet and E-commerce, Enhancing Web server security, Wireless Network Security Solutions for consideration.	06

Text/Reference Books:

1. Stallings, William, " Cryptography and Network Security : Principles and Practice"
2. Vacca, " Guide to Wireless Network Security"
3. Menezes, Vanstone, " Handbook of Applied Cryptography"

TERMWORK: Term work will consist of record of minimum 8 experiments based on the syllabus.

EC42075 Systems Programming (Elective-II for EC/IE)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	50 Marks

	Topics and Contents	**Hours**
1	**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)	10
2	**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.	10
3	**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,	06
4	**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.	08
5	**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.	06

Text Books:

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

Reference Books:

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

TERMWORK: Term work will consist of record of minimum 08 experiments based on the syllabus.

EC42072 Mobile Computing (Elective-II for EC/IE)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	04 Hrs. / Week	Paper:	100 Marks
Practical:	02 Hrs. /Week	Practical:	--
		Term Work:	50 Marks

	Topics and Contents	**Hours**
1	**Communication Architecture.** Principle of Wireless Communication, Overview 1G,2G,2.5G,3G and 4G technologies, Introduction to CT2, DECT, PHS, PACS,GSM, GPRS, ATM, CDMA, GSM architecture, signaling techniques in network ,GSM mobility management and Handoff management, challenges of mobile computing, Cellular system & related concepts.	10
2	**Protocol Architecture:** CDPD, VoIP, GPRS services, WLL system, IPv6 & its application in mobile computing.	08
3	**Wireless Application Protocol (WAP)** WAP environment & architecture, protocol & its application, Micro browser, WAP security, Wireless Telephony application, WAP gateways, & WAP strategies. Fundamentals of WML, writing and formatting text, Navigation between cards and Decks ,Displaying images, Tables, Using variables , acquiring user input.	10
4	**Cellular Technologies:** Spread Spectrum principle, DSSS, FHSS, Bluetooth scenario, architecture, various layers of Bluetooth & link manager protocol, IEEE 802.11 network topology, Adhoc network MAC & its management. HIPERLAN & its types, HIPERLAN2 & its features.	08
5	**Distributed Mobile Computing:** Distributed OS & file system, Mobile computing software (pervasive computing), Data management for mobile computing.	04

Text/Reference Books :

1. Yi Bing Lin, “Wireless and Mobile Networks Architecture”, John Wiley.
2. Schiller, “Mobile Communication” Pearson Education.
3. Sandeep Singhal, Thomas Bridgman, “ Wireless Application Protocol”,Pearson Education
4. Asoke K Talukder –“ Mobile Computing”TMH.
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6. Jochen Burkhardt, et.al. Pervasive Computing, Technology and Architecture of Mobile Internet Applications, Addison Wesley,2002.

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EC42071 Advanced Digital Signal Processing
(Elective-II for Electronics & Communication)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	50 Marks

	Topics and Contents	**Hours**
1	**Random Signals** Characterization of random signals: review of deterministic signals, random signals, correlation function, power spectra, DT random signals, time averages for DT random process. filters in sampling rate alteration systems, digital filter banks and their analysis and applications, multi level filter banks, estimations of spectra from finite – duration observation of signals. sample rate conversion using poly-phase filter structures, Efficient D/A conversion in Hi-Fi systems.	06
2	**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.	08
3	**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.	06
4	**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.	08
5	**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.	06
6	**Applications of DSP using MATLAB** Mobile communication, medical, image processing**,** Acoustic Noise Canceler, Dynamic range compression, LPC analysis and synthesis, SSB modulation, Radar tracking implementetion	06

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9. Mathworks manuals.
10. Applications to DSP Using Matlab by proakis

TERMWORK: Term work will consist of record of minimum 8 practicals out of the following using matlab.

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

Implementation of the following DSP Algorithms on DSP processors:

9. Implementation of FIR Filter.
10. Implementation of IIR Filter

EC42072 Mobile Computing
(Elective-II for Electronics & Communication)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	04 Hrs. / Week	Paper:	100 Marks
Practical:	02 Hrs. /Week	Practical:	--
		Term Work:	50 Marks

	Topics and Contents	**Hours**
1	**Communication Architecture.** Principle of Wireless Communication, Overview 1G,2G,2.5G,3G and 4G technologies, Introduction to CT2, DECT, PHS, PACS,GSM, GPRS, ATM, CDMA, GSM architecture, signaling techniques in network ,GSM mobility management and Handoff management, challenges of mobile computing, Cellular system & related concepts.	10
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5	**Distributed Mobile Computing:** Distributed OS & file system, Mobile computing software (pervasive computing), Data management for mobile computing.	04

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TERMWORK: Term work will consist of record of minimum 08 experiments on the syllabus

EC42073 Artificial Intelligence
(Elective-II for Electronics & Communication)

Teaching Scheme :		**Exam Scheme :**	
Lectures:	4 Hrs. / Week	Paper:	100 Marks
Practical:	2 Hrs. /Week	Practical:	--
		Term Work:	50 Marks

	Topics and Contents	**Hours**
1	**Introduction To Artificial Intelligence** Definition, AI Applications, AI representations, properties of internal representations Heuristic Search Techniques, Best File Search, Mean and End Analysis, A* and AO* Algorithms	07
2	**Game Playing & Predicate Logic** Minimax search procedure, Alpha-beta cut-offs, Waiting for Quiescence, Secondary Search, Predicate Calculus, Predicate and arguments, ISA Hierarchy, Frame Notation, Resolution, Natural Deduction	07
3	**Knowledge Representation Using Non-Monotonic Logic** Truth Maintenance System, Statistical and Probabilistic Reasoning, Semantic-net Frames, Script, Conceptual Dependancy.	07
4	**Planning** Block world, strips, Implementation using goal stack, Non-linear planning using goal stacks, Hierarchical planning, List commitment strategy	07
5	**Neural Networks** Learning by training neural networks, Introduction to neural networks, Neural net architecture & applications, Natural language processing & understanding & paragmatic, Syntactic, Semantic, Qualities, finite state machines, RTN, ATN, understanding sentences	07
6	**Expert Systems** Utilization and functionality, Architecture of expert systems, Knowledge representation, Two case studies on expert systems	07

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Reference Books

1. Eugane. Charniak, Frew, “Introduction to Artificial Intelligance”, McDermott
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TERMWORK: Term work will consist of record of minimum 08 experiments out of the following list

List of Practicals

1. Implement the game ‘Tic-Tac-Toe’ by using intelligent algorithm (or magic square method)

2. Implement A* algorithm to solve the problem of 8-puzzle (consider any initial state and final state)
3. Shoe the working of A0 algorithm
4. Implement the game using 8 tile puzzle using depth first search technique
5. Implement the game using 8 tile puzzle using Bredth first search technique
6. Implementation of simple neural network architecture for any pattern recognition application.
7. Implement the prolog for Family history management
8. Implement the authentication program
9. Implement the program for graphics (Individual)
10. Implement the expert system (Mini project : Group task)

EC4208 Project Part-II

Practical:	6 Hrs. /Week	Practical Exam	: 100 Marks
		Term –work	: 50 Marks

Term –work:

Project part II will be continuation of project part-I under taken by the candidates in the first term. The term work shall consist of a typed report of about 60 pages on the work carried out by a batch of students in respect of the project assigned during the first term part-I and the second term Part-II .

Practical Examination:

It shall consist of an oral examination based on the report submitted by the candidates and or the demonstration of the fabricated design project. The said examination will be conducted by a panel of two examiners consisting of preferably the guide working as a senior and other external examiner preferably from Industry or the university.

Note:

The candidate must bring the project part-I report and the final report completed in all respect while appearing for practical examination of the project.