COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	ADVANCED MATHEMATICS	MA-104	Min "D"	Min "D"	5.0

ADVANCED MATHEMATICS

UNIT - I :

Numerical solution of partial differential equation by Finite difference method. Elementary properties of FT, DFT.

UNIT - II :

Probability, compound probability and discrete random variable. Binomial, Normal and Poisson distribution. Elementary concept of estimation and theory of hypothesis, Expectation and its properties.

UNIT - III

Stochastic process, Markov process, transition probability matrix, just and higher order Markov process, Markov chain, Queuing theory : (M/M/1: ∞/∞/FCFS), (M/M/S: ∞/∞/FCFS) models.

UNIT - IV:

Review of set theory binary relations, equivalence relations, principle of partition, Elementary concept of group, ring and field, Applications of algebraic structures in Electronics and Communications.

UNIT - V :

Sturm– Liouville problems, Green's Function in Closed form, Green's Function in integral form. Green's Identities and methods, Green's first & Seconds identities, Generalized Green's Function.

References :

1. Numerical Methods in Science & Engineering by Dr. M.K Venkataraman, The National Pub. Co. 1991.
2. Computer Oriented statistical and Numerical Methods by B Balaguru Swamy, Mac millan India Ltd. 1998
3. Numerical Methods for Scientific and Engineering Computation by M.K Jain, S.R.K Iyengar and R,K Jain Wiley Eastern Ltd, 1987
4. Communication Systems by S Haykins, John Wiley and Sons
5. Green's Function and Boundary Value Problems by I.Stackgold, Wiley, New York, 1979
6. The finite element method, by O.C.Zienkiewicz, McGraw-Hill

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	INTRODUCTION TO SIGNAL ANALYSIS	EC-101	Min "D"	Min "D"	5.0

INTRODUCTION TO SIGNAL ANALYSIS

UNIT- I : VECTOR SPACES :

Vector Spaces and Subspaces, Linear Independence, Basis and Dimension, Affine Space, Quotient Space.

LINEAR TRANSFORMATIONS : The Algebra of Linear Transformations, Isomorphism, Representation of Transformations by Matrices, Kernel and Image of a Linear Transformation, The Transpose of a Linear Transformation.

UNIT - II : INNER PRODUCT SPACES :

The Euclidean Plane and the Dot Product, General Inner Product Spaces, Orthogonal Vectors and Subspaces, Orthogonal Projections onto a Line, Orthonormal Bases and Gram-Schmidt.

UNIT - III : REVIEW OF RANDOM VARIABLE :

Moment generating function, Chernoff bound, Markov's inequality, Chebyshev's inequality, Central limit Theorem, Chi square, Rayleigh and Rician distributions, Correlation, Covariance matrix- Stationary processes, Wide Sense Stationary Processes, Ergodic Process, Cross Correlation and Autocorrelation functions-Gaussian process.

UNIT - IV

Representation of Bandpass Signals and Baseband Processing, Response of Linear Systems to Random Process, Orthogonal Expansion of Signals, Concept of Signal Space.

UNIT - V

Optimal Reception in AWGN, Matched Filter and Correlation, Geometry of the ML Decision Rule, Soft Decisions, Performance analysis of ML Reception, Performance with Binary Signaling, Performance with M-ary Signaling, Nyquist Filtering and Inter Symbol Interference.

References :

1. Linear Algebra and its Applications by Strang G.
2. Linear Algebra by Hoffman K. and Kunze R.
3. Linear Algebra – A Geometric Approach by Kumaresan S.
4. Probability, Random Variables, and Stochastic Processes by Papoulis A. and Pillai U.
5. Digital Communications by Proakis J. G.
6. Principles of Digital Communication by Gallager R. G.
7. Fundamentals of Digital Communications by Madhow U.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	DIGITAL COMMUNICATION NETWORK	EC-102	Min "D"	Min "D"	5.0

DIGITAL COMMUNICATION NETWORK

UNIT - I : INTRODUCTION : DATA COMMUNICATION & NETWORKING OVERVIEW :
A Communication Model, Data Communication, Uses of Computer Networks, Network Hardware, Network Software, Network Topology, Data Communication Networking, Data Transmission, Transmission Modes, Signal Encoding Techniques.
Protocol Architecture: Need for a Protocol Architecture, A Simple Protocol Architecture, OSI, TCP/IP Protocol Architecture, Comparison of OSI, TCP/IP Model, Critique of OSI Model and Protocol, Critique of TCP/IP Model.
UNIT – II : DIRECT LINK NETWORK : Digital Data Communication Techniques, Data Link Protocol, Sliding Window Protocol, Protocol Verification, HDLC, Channel Allocation Problem, Multiple Access Protocol, Ethernet, Rings, Wireless, Data Link Layer Switching.
UNIT – III : NETWORK LAYER : LAN, MAN, WAN, Switching Networks, Routing in Switching Networks, Congestion Control in Switched Data Networks , Network Layer Design Issues, Routing Algorithm, The optimality principle, The shortest path routing, Flooding, Distance Vector, Link State, Hierarchical, Broadcast & Multicasting Routing, Routing for Mobile Hosts, Routing in Ad-Hoc Networks,
Congestion Control Algorithm, Quality of Services, Internetworking.
UNIT- IV : NETWORK SECURITY : Introduction to Cryptography, Substitution Cipher, Transposition Ciphers, One Time Pads, Two Fundamental Cryptographic Principles, Symmetric Key Algorithms, Public Key Algorithms, Symmetric Key Signatures, Public Key Signatures, Message Digest, Birthday Attack, Management of Public Keys. IP security, Firewalls, Virtual Private Networks, Wireless Security, Authentication Protocols, PGP- Pretty Good Privacy, PEM- Privacy Enhanced Mail, Threats, Secure Naming, Secure Sockets Layer, Mobile Code Security, Privacy, Freedom of Speech, Copyright.
UNIT- V : NETWORK MANAGEMENTS :Introduction to Network Managements, Network Management Framework, Network Based Managements, Evolution of Network Management: SGMP, CMIP, SNMP. Network Implementation and Management Strategies, Network Management Categories: Performance Management, Fault Management, Configuration Management, Security Managements, Accounting Managements. Network Management Configuration: Centralized Configuration, Distributed Configuration, Selected Management Strategy.

References:

1. "Data and Computer Communication" by William Stallings, 7th edition, Pearson
2. "Computer Networks" by A. S. Tanenbaum , 4th edition, EEE
3. "Cryptography and Network Security by William Stallings, Principles and Practice" Pearson
4. "Cryptography and Network Security" by Atul Kahate, Mc Graw Hill
5. "TCP/IP Protocol Suite" by Forouzan, 4th edition, TMH
6. "Network Management Concept and Practice" by J.Richard Burkey, PHI

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	STATISTICAL SIGNAL PROCESSING	EC-103	Min "D"	Min "D"	5.0

STATISTICAL SIGNAL PROCESSING

UNIT- I : REVIEW :

IIR and FIR filters design, Filtering problems, Advanced signal processing techniques and transforms, Multirate Signal processing – Down sampling/up sampling, Introduction to discrete Hilbert transform, wavelet transform, Haar transform.

State Estimation Filter- Concept of Estimation of linear and nonlinear signals, estimation Wiener Filter Non linear Estimation-Concept of sufficient statistics and statistical estimation of parameters .

UNIT- II : ADAPTIVE FILTERING :

Introduction to Adaptive filtering, Types of adaptive filters, Introduction to Statistical signal Detection, Four classes of application in interference (noise, echo) cancellation, Identification, Inverse modeling, prediction. Least mean square filter (LMS), Recursive least square filter (RLS), Simulation and design of LMS and RLS filters ,its Applications. Binary decisions with multiple observations, Vector observations, Waveform Observation, Detection of signals in additive Gaussian Noise, random noise and color noise.

UNIT- III : KALMAN FILTERS :

Introduction to Kalman Filters (KF) . Adaptive beam forming. Kalman filtering. state measurement and estimation for scalar random variables , prediction and estimation of Linear signals, design techniques, Extended Kalman filter (EKF), prediction and estimation of nonlinear signals, applications of KF,EKF in audio and speech signals detection.

UNIT- IV :

Filtering of Random Processes, Spectral factorization, Special types of Random Processes, The Levinson-Durbin Recursion, The Inverse Levinson-Durbin Recursion, The Cholesky Decomposition, Inverting a Toeplitz matrix.

UNIT – V :

Wiener filtering, The FIR Wiener filter, Linear prediction, Noise Cancellation, The IIR Wiener filter, Causal and noncausal IIR Wiener filter, Causal Wiener filtering, Causal linear Prediction, Wiener deconvolution.

References :

1. "Statistical Signal Processing Vol. 1 : Estimation Theory, vol. 2 : Detection Theory " by Steven. M. Kay, Prentice Hall Inc, 1995.
2. "Adaptive Filter theory" by S. Haykin, Pearson Education publication.
3. "Detection, Estimation and Modulation Theory Part 1" by Harry L. Van Trees, John Wiley & Sons Inc, 1968.
4. "Statistical Digital Signal Processing and Modeling" by Monson H. Hayes, John Wiley and Sons, Inc.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	IMAGE PROCESSING	EC-104	Min "D"	Min "D"	5.0

IMAGE PROCESSING

UNIT-I : DIGITAL IMAGE PROCESSING :

Elements of a Digital Image Processing system, Structure of the Human eye, Image formation and contrast sensitivity, Sampling and Quantization, Neighbours of a pixel, Distance measures, Photographic file structure and exposure, Filem characteristics, Linear scanner, Video camera, Image processing applications.

UNIT-II : IMAGE TRANSFORMS:

Introduction to Fourier transform-DFT, Properties of two dimensional FT,Separability, Translation, Periodicity, Rotation, Average value, FFT algorithm, Walsh transforms,Hadamard transform, Discrete Cosine transform, Wavelet transform and comparison of all the transforms.

UNIT - III : IMAGE ENHANCEMENT :

Definition, Spatial domain methods, Frequency domain methods, Histogram modify technique, Neighborhood averaging, Media filtering, Lowpass filtering, Averaging of multiple images, Image sharpening by differentiation and high pass filtering.

UNIT – IV : IMAGE RESTORATION :

Definition, Degradation model, Discrete formulation, Circulant matrices, Block circulant matrices, Effect of diagnolization of circulant and block circulant matrices, Unconstrained and constrained restorations , Inverse filtering, Wiener filter, Restoration in spatial domain.

UNIT - V : IMAGE ENCODING :

Objective and subjective fidelity criteria, Basic encoding process, Variable length coding, LZW, Bit-plane coding-Bit-plane coding, Lossless predictive coding - Lossy compression: Lossy predictive coding, transform coding, wavelet coding. Image compression. Introduction to all the Image compression techniques and standards, CCITT, JPEG, JPEG 2000, Video compression standards ..

References :

1. "Digital Image Processing" by Rafael, C. Gonzlez., and Paul, Wintz, Addison-Wesley Publishing Company.
2. "Fundamentals of Digital Image Processing" by Jain Anil K. Prentice Hall.
3. "Digital Image Processing" by Sosenfeld, and Kak, A.C., Academic Press.
4. The Image Processing Handbook, (5/e), CRC, 2006 by J.C. Russ,
5. Digital Image Processing with MATLAB by . R.C.Gonzalez & R.E. Woods; Prentice Hall, 2003

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	SIGNAL & IMAGE PROCESSING LAB	EC-105L	Min "D"	Min "D"	5.0

SIGNAL & IMAGE PROCESSING LAB

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

(Suggested Exercise)

MATAB Software programming based on the topics signal generation, Z Transforms, Hardamard Transforms, FFT Transforms. HR & FIR filter design, Image read, binarize, Transform and enhancement programmers, Image & Signal processing using wavelet transform. Some lab experiments based on different DSP kits and IEEE standards experimental kits etc.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	MINOR PROJECT – I	EC-106L	Min "D"	Min "D"	5.0

MINOR PROJECT – I

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

(Suggested Exercise)

Developing research ability and finding solution of any application oriented problem. Project problems may be implemented in any hardware or software or solutions. There will be a term work presentation/ Seminar and viva-voce. Two students will work in one batch which may be approved by professor-in-charge of the lab.