Advanced Mathematics
MEDC 101

Unit 1 : Partial Differential Equation
Solution of Partial Differential Equation (PDE) by separation of variable method, Numerical solution of PDE (Laplace, Poisson's, Parabola) using finite difference Methods.

Unit 2 : Matrices And Linear System Of Equations
Solution of linear simultaneous equations by Gaussian elimination and its modification, Crout's triangularization method, Iterative methods-Jacobins method, Gauss-Seidal method, Determination of Eigen values by iteration.

Unit 5 : Calculus Of Variations
Euler-Lagrange's differential equation, The Brachistochrone problems and other applications. Isoperi-metric problem, Hamilton's Principle and Lagrange's Equation, Rayleigh-Ritz method, Galerkin method.

Unit 4 : Fuzzy Logic
Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their
application.

Unit 5 : Reliability
Introduction and definition of reliability, derivation of reliability functions, Failure rate, Hazard rate, mean time t future & their relations, concepts of fault tolerant analysis.

Reference Books:
1. Higher Engineering Mathematics - by Dr. B.S. Grewal; Khanna Publishers
2. Calculus of Variations - by Elsgole; Addison Wesley.
3. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH.
4. Introductory Methods of Numerical Analysis by S.S. Shastry,
5. Calculus of Variations - by Galfand & Fomin; Prentice Hall.
6. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
7. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
8. Numerical Solution of Differential Equation by M. K. Jain
9. Numerical Mathematical Analysis By James B. Scarborogh
10. Fuzzy Logic in Engineering by T. J. Ross
11. Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

Digital Communication
MEDC-102

UNIT 1:
Digital PAM, binary PAM formats, line coding, band limited digital PAM systems, Nyquist pulse shaping, equalization, synchronization techniques, bit and frame synchronization. Coded pulse modulation, voice digitization rate (VDR) of PCM, DPCM, DM, ADM, CVSD, log PCM, their performance comparison, VDR reduction by speech coding, VOCODERS, noise performance of PCM and DM, Digital multiplexes. AT & T and CCITT hierarchies, quasi-synchronous multiplexes.

UNIT 2:
Digital CW modulation, BPSK, DPSK, DEPSK, QPSK, Mâ ™ary PSK, QASK, BFSK, Doubinary encoding, QPR coherent and non-coherent systems, error probabilities in PSK, DPSK, FSK, QPSK, 16 QAM, MSK, QPR and bit.

UNIT 3:
Matched correlation and optimum filters and symbol error rate.

UNIT 4:
Spread Spectrum techniques: DS, CDMA, FH, PN sequence, Power requirement, PN- sequence code, and Walshâ ™s code.

UNIT 5:
ISDN & Value added communication system simulation & Analysis using MATLAB & Simulink Application using communication toolboxes.

Books :

1. Digital Communication. By Haykins Mc Graw Hill Int Edition.
2. Modern Digital & Analog Communication . By B P Lathi,. Willey Eatern Ltd. 2000.
3. Communication. Systems by A B Carlson, Tata Mc Graw Hill, 2000.

VLSI Technology & Design
MEDC-103

UNIT – I:
Review of Microelectronics and Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology, Trends And Projections. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: Ids-Vds relationships, Threshold Voltage Vt , Gm, Gds and ωo, Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Zpu/Zpd, MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT – II:
Layout Design And Tools: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools.
Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT – III:
Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT –IV:
Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT – V:
Floor Planning & Architecture Design: Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOCs and Embedded CPUs, Architecture testing.

References:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian Eshraghian. D, A.Pucknell, 2005, PHI.
2. Modern VLSI Design - Wayne Wolf, 3rd ed., 1997, Pearson Education.
3. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., Adisson Wesley.

Advanced Digital Signal Processing
MEDC-104

Unit 1 : Discrete Time signals - sequences, representation
Discrete Time Systems Linear, Time invariant, LTI System, properties, constant coefficient difference equation. Frequency Domain Representation of discrete time signals & systems

Unit 2 : Discrete Time Random Signals
Z Transform properties, R.O.C, stability, Causality criterion,Inverse Z- Transform , Recursive and Non recursive systems, Realization of discrete time system.

Unit 3 : D.F.T â " properties, linear and circular convolution
Discrete Cosine transform, relationship between DFT & DCT, I.D.F.T , computation of D.F.T : F.F.T â " Decimation in time & Decimation in frequency.

Unit 4 : F.I.R and I.I.R Systems :
Basic structure of FIR & IIR, Bilinear transformation, Design of discrete time I.I.R filters â " Butterworth, Chebychev, Inv. Chebychev, elliptic etc. Design of F.I.R filters by windowing â " rectangular,Bartlett, Hann, Hamming, Kaiser window filter , Design method , Relationship of Kaiser to other windows. Application of MATLAB for design of digital filters Effect of finite register length in filter design.

Unit 5 : Advanced signal processing techniques and transforms:
Multirate Signal processing Down sampling/upsampling, Int. to discrete Hilbert transform, wavelet transform, Haar transform etc. Application of DSP to Speech Signal Processing.

References :
1. A.V Opprenheim and R.W Schaffer, â œDiscrete â " Time signal processingâ (2nd edition) , Prentice Hall
2. S. Mittra Digital Signal Processing using MATLAB, 2nd Edition.
3. Proakis, Int. to Digital Signal Processing, Maxwell Mcmillan.

Information Theory & Coding
MEDC-105

Unit I: **Information Theory**
Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.

Unit-II : Error Control Coding: Block Codes
Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder and decoder - CRC

Unit-III: Error Control Coding: Convolutional Codes

Convolutional codes – code tree, trellis, state diagram - Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding

Unit-IV: Source Coding: Text, Audio And Speech
Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 - Speech: Channel Vocoder, Linear Predictive Coding

Unit-V Source Coding: Image and Video

Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG standard

Text Books:
1.R Bose, "Information Theory, Coding and Cryptography", TMH 2007
2.Fred Halsall, "Multidedia Communications: Applications, Networks, Protocols and Standards", Perason Education Asia, 2002
3.K Sayood, "Introduction to Data Compression" 3/e, Elsevier 2006
4.S Gravano, "Introduction to Error Control Codes", Oxford University Press 2007
5.Amitabha Bhattacharya, "Digital Communication", TMH 2006