M. TECH. ELECTRONICS & COMMUNICATION ENGINEERING

(SIGNAL PROCESSING)

(1st Year)

Total Contact Hours = 24 **Total Marks = 600** **Total Credits = 22**

SEMESTER 1st		Contact Hrs			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MECE3-101	Advanced Mathematics	4	0	0	40	60	100	4
MECE3-102	Digital Signal Processing	4	0	0	40	60	100	4
MECE3-103	Statistical Signal Processing	4	0	0	40	60	100	4
MECE3-104	Research Lab-I	0	0	4	60	40	100	2
Departmental Elective – I (Select any one)		4	0	0	50	100	150	4
MECE3-156	Biomedical Electronics							
MECE3-157	Information Theory and Coding							
MECE3-158	Electronics System Design							
MECE3-159	Soft Computing							
Departmental Elective – II (Select any one)		4	0	0	50	100	150	4
MECE3-160	Digital Filter Design and Applications							
MECE3-161	Optoelectronics							
MECE3-162	Hardware Description Languages and VLSI Design							
MECE3-163	Cryptography and Network Security							
Total	**Theory = 5 Lab = 1**	**20**	**0**	**4**	**260**	**340**	**600**	**22**

M. TECH. ELECTRONICS & COMMUNICATION ENGINEERING

(SIGNAL PROCESSING)

(1st Year)

Total Contact Hours = 24 **Total Marks = 700** **Total Credits = 22**

SEMESTER 2nd		Contact Hrs			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MECE3-205	Wavelet Transforms for Signal and Image Processing	4	0	0	40	60	100	4
MECE3-206	Random Processes	4	0	0	40	60	100	4
MECE3-207	Research Lab-III	0	0	4	60	40	100	2
Departmental Elective – III (Select any one)		4	0	0	50	100	150	4
MECE3-264	Signal Acquisition and Conditioning							
MECE3-265	Signal Compression Theory and Methods							
MECE3-266	Array Signal Processing							
MECE3-267	Advanced Network Synthesis and Analysis							
Departmental Elective – IV (Select any one)		4	0	0	50	100	150	4
MECE3-268	Digital Control Systems							
MECE3-269	Nano Electronics							
MECE3-270	Multimedia and Signal Coding							
MECE3-271	MEMS and NEMS							
Open Elective – I (Select any One)		4	0	0	50	100	150	4
Total	**Theory = 5 Lab = 1**	**20**	**0**	**4**	**260**	**340**	**600**	**22**

M. TECH. ELECTRONICS & COMMUNICATION ENGINEERING
(SIGNAL PROCESSING)
(2nd Year)

Total Contact Hours = 26 **Total Marks = 500** **Total Credits = 26**

SEMESTER 3rd		Contact Hrs			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MECE3-308	Research Methodology	4	0	0	40	60	100	4
MECE3-309	Professional Writing	4	0	0	40	60	100	4
MECE3-310	Project	0	0	10	50	50	100	10
MECE3-311	Seminar on Advanced Topics from Referred Journals	0	0	4	100	0	100	4
Departmental Elective – V (Select any one)		4	0	0	50	100	150	4
MECE3-372	Antenna System Design							
MECE3-373	Error Control and Coding							
MECE3-374	Spectrum Analysis							
MECE3-375	Graph Theory							
Total	**Theory = 3 Lab = 2**	**12**	**0**	**14**	**270**	**230**	**500**	**26**

MRSPTU

M. TECH. ELECTRONICS & COMMUNICATION ENGINEERING
(SIGNAL PROCESSING)
(2nd Year)

Total Credits = 20

SEMESTER 4th		Contact Hrs			Evaluation Criteria	Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Satisfactory/ Unsatisfactory**	
MECE3 -412	Thesis	0	0	20		20

Overall

Semester	Marks	Credits
1st	600	22
2nd	600	22
3rd	500	26
4th	--	20
Total	**1700**	**90**

ADVANCE MATHEMATICS

Subject Code: MECE3-101 **LT PC** **Duration: 45 Hrs.**
4 0 0 4

UNIT-I (11 Hrs.)

Fourier Transforms, Inverse Fourier Transform, Properties, Modulation Theorem, Convolution Theorem for Fourier Transforms, Parseval' s Identity, Fourier Transforms of derivative of functions, Relation between Fourier and Laplace transform, Properties of Z-Transforms, Evaluation of inverse Z – Transforms.

UNIT-II (12 Hrs.)

Solution of linear simultaneous equations by Gaussian elimination and its modifications, Crout's triangularization method, Iterative method's-Jacobi's method, Gauss-Seidel method and Largest Eigen value by iteration.

Euler-Lagrange's differential equation, Isoperi-metric problem, Hamilton's Principal and Lagrange's Equation.

UNIT-III (11 Hrs.)

Conformal mapping, Exponential function, Trigonometric functions, Hyperbolic functions, Inverse trigonometric functions, Logarithmic function, Power function, Bilinear and Schwarz-Christoffel transformation, Applications to engineering problems.

UNIT-IV (11Hrs.)

Series solution of differential equations, Power series methods, Legendre's polynomial, generating functions, Recurrence relations, Frobenius method, Series solution of Bessel's differential equation, Modified Bessel's functions, Generating functions, Recurrence relations, Equations reducible to Bessel's equation, Sturm Liouville's problem, orthogonal functions.

Recommended Books:

1. Advanced Engineering Mathematic (6th Edition) by Clarence Raymond Wylie and Louis C. Barrett, Mc Graw hill, 1995
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, 1988
3. Fourier Series and Boundary Values Problems by James Brown, Ruel Churchill, McGraw Hill, 2011

DIGITAL SIGNAL PROCESSING

Subject Code: MECE3-102 **LT PC** **Duration: 45 Hrs.**

4 0 0 4

UNIT-I (10 Hrs.)

DISCRETE TIME SIGNALS AND SYSTEMS

Signals, Classification of signals, Signal processing, Basic elements of a digital signal processing system, Advantages of digital signal processing over analog signal processing, Sampling, Aliasing, Discrete-time systems, Analysis of discrete-time linear shift-invariant systems, Linearity, Causality and stability criterion, Discrete-time systems described by difference equations, Convolution.

UNIT-II (13 Hrs.)

DISCRETE TRANSFORMS

The Fourier transform of discrete-time signals (DTFT), Properties of the DTFT, The frequency response of an LTI discrete-time system, Frequency domain sampling and DFT: Properties of DFT, Linear filtering using DFT, Frequency analysis of signals using DFT, radix 2, Goertzel algorithm, Efficient computation of the DFT: Decimation-in-time and decimation-in frequency, Linear convolution using DFT, Fast Fourier transform algorithms, Applications of FFT algorithm, Introduction to the Z-transform & the inverse Z-transform, Properties of the Z-transform, Relationship between the Fourier transform and the Z-transform, System function, Analysis of linear time-invariant systems in the Z-domain.

UNIT-III (9 Hrs.)

IMPLEMENTATION OF DISCRETE TIME SYSTEMS:

Direct form, Cascade form, Frequency sampling and lattice structures for FIR systems. Direct forms, Transposed form, Cascade form, Parallel form. Lattice and lattice ladder structures for IIR systems.

UNIT-IV (13 Hrs.)

DESIGN OF FIR IIR FILTERS:

General considerations of digital filter design, Characteristics of practical frequency selective filters. Filters design specifications, Design of FIR filters using windows, Gibbs phenomenon, Design of FIR filters by frequency sampling method, Design of optimum equiripple FIR filters. Comparison of design methods for FIR filters. Design of IIR filters from analog filters, Design by approximation of derivatives, Impulse invariance method, Bilinear transformation method, Characteristics of Butterworth, Chebyshev and Elliptical analog filters, Frequency transformation, Least square methods.

TEXT BOOKS

1.Digital Signal Processing: Principles, Algorithms and Applications by John G. Proakis & Dimitris G. Manolakis; Pearson Education (2nd Edition).

2.Openheim A.V. & Schafer R.W., Discrete Time Signal Processing PHI,1998 (2nd Edition).

REFERENCE BOOKS

1.Digital Signal Processing by Alan V. Oppenheim & Ronald W. Schafer; PHI Publication, 2007 (1st Edition).

2.Theory & Application of Digital Signal Processing by Rabiner & Gold; PHI Publication 2007 (1st Edition).

STATISTICAL SIGNAL PROCESSING

Subject Code: MECE3-103 **LT PC** **Duration: 45 Hrs.**
4 0 0 4

UNIT I (13 Hrs.)

Background: discrete-time signal processing, linear algebra, Mathematical preliminaries, Random variables & discrete-time random processes, Wiener filtering and MMSE estimates, Linear predication, Levinson-durbin algorithm and lattice, Classical detection and estimation theory, Statistical Models: Gaussian Distribution and relatives, Reproducing Distributions, Sample mean and variance, Fundamental of parametric and Linear Estimation.

UNIT II (12 Hrs.)

Filters: Optimal Linear Filtering and Prediction, Overview of Spectral Estimation Methods. Adaptive Algorithms: LMS Algorithm, Convergence Analysis, Adaptive Noise Canceller, Lattice filters, Wiener filtering, Spectrum estimation, Adaptive filtering, Fundamentals of Detection, Detection Strategies for composite hypothesis.

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UNIT III (9 Hrs.)

Least Squares Algorithm: General Weighted Least Squares Methods, Recursive Least Squares Algorithm, Fast Least Squares Algorithm to AR modelling case.

UNIT IV (11 Hrs.)

Introduction to array processing, Composite Hypotheses in the Univariate Gaussian Model, Composite Hypotheses in the Multivariate Gaussian Model, Statistical Confidence Intervals.

TEXT AND REFERENCE BOOKS:

1. Fundamentals of Statistical Signal Processing (Volume-1): Estimation Theory by Steven M. Kay, Pearson Publications, 2010
2. Discrete Random Signals and Statistical Signal Processing (Volume-1) by Charles W. Therrien, Prentice Hall, 1992
3. Statistical Signal Processing: Detection, Estimation and Time Series Analysis by Louis L. Scharf, Addison-Wesley Publishing Company, 1991
4. An Introduction to Statistical Signal Processing by Robert M. Grey and Lee D. Davisson, Cambridge University Press, 2004
5. Statistical Digital Signal Processing and Modeling by Monson H. Hayes, John Wiley, 1996

RESEARCH LAB-I

Subject Code: MECE3-104 **LT PC**
0 0 4 2

Every subject In-Charge will define at least one practical project to each student (preferably different) of his/her concerned subject to be performed in Research Lab.

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BIOMEDICAL ELECTRONICS

Subject Code: MECE3-156 **LT PC** **Duration: 45 Hrs.**
4 0 0 4

UNIT-I (12 Hrs.)

Physiology & Human Nervous System: Cell, Bioelectricity, Sodium Potassium pump, Action and Resting potentials, Bioelectric Signals, Nervous System, Peripheral Nervous System, Autonomic Nervous System, SNS, PNS.

UNIT-II (12 Hrs.)

Electro-Physiological Measurements Basic components of biomedical electronics system, Electrodes: Micro, Needle and Surface electrodes, Electrical activity of heart, Generation and Recording of ECG signals, ECG Waves and Time Intervals, Heart Rhythms, Heart beat morphologies, Noise and artifacts, Respiratory system, EEG, EEG Rhythms and waveforms, Recording.

UNIT-III (11 Hrs.)

Non-Electrical Parameter Measurement: Blood pressure measurement, Cardiac output, Heart Sounds, Respiratory rate, Gas volume, Flow rate, ph value, ESR, GSR, Plethysmography.

UNIT-IV (10 Hrs.)

Assistive Restorative and Medical Imaging Equipments: Phonocardiography, Vectrocardiography, Defibrillators, Pacemakers, X-Ray, Ultrasonography, Computer Tomography, MRI.

TEXTS/REFERENCES BOOKS:

1. Introduction to Biomedical Equipment Technology (4th Edition) by Joseph J. Carr and John M. Brown, Pearson Education India, 2001
2. Biomedical Instrumentation and Measurements by Leslie Cromwell, Fred J, Weibell and Erich A. Pfeiffer, Prentice Hall of India Pvt. Ltd, New Delhi, 1980
3. Medical Instrumentation Application & Design (3rd Edition), by John G. Webster, Wiley India
4. Handbook on Biomedical Instrumentation by Khandpur R S, TMH
5. Introduction to Biomedical Instrumentation: The Technology of Patient Care by Barbara Christe, Cambridge University Press, 2009

INFORMATION THEORY AND CODING

Subject Code: MECE3-157 **LT PC** **Duration: 45 Hrs.**
4 0 0 4

UNIT-I (11 Hrs.)

Elements of information theory Source coding theorem, Huffman coding, Channel coding theorem, channel capacity theorem, Shenonfano theorem, entropy

UNIT-II (11 Hrs.)

Sampling Process Base band and band pass sampling theorems reconstruction from samples, Practical aspects of sampling and signal recovery TDM

UNIT-III (11 Hrs.)

Waveform Coding Techniques PCM Channel noise and error probability DPCM and DM Coding speech at low bit rates Prediction and adaptive filters. Base band shaping for data transmission, PAM signals and their power spectra Nyquist criterion ISI and eye pattern Equalization.

UNIT-IV (12 Hrs.)

Digital Modulation Techniques Binary and M-ary modulation techniques, Coherent and non-coherent detection, Bit Vs symbol error probability and bandwidth efficiency. Bit error analysis, using orthogonal Signalling. Error Control Coding Rationale for coding Linbear block codes, cyclic codes and convolution codes Viterbi decoding algorithm and trellis codes.

BOOKS RECOMMENDED:

1. J. Dass. S.K. Malik & P.K. Chatterjee," Principles of digitals communication:,Wiley-Blackwel, 1991.

2. Vera Pless," Introduction to the theory of Error correcting codes", Edition 3, July 2, 1998

3. Robert G. Gallanger," Information Theory and Reliable Communication", Mc Graw Hill, 1992

ELECTRONICS SYSTEM DESIGN

Subject Code: MECE3-158 **LT PC** **Duration: 45 Hrs.**
4 0 0 4

UNIT-I (10 Hrs.)

MSI and LSI Circuits and Their Applications: Review of Digital electronics concept, Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR and AND OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.

UNIT-II (12 Hrs.)

Sequential Machines: The Concept of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set/Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock F/F, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters, Shift Registers and Memory.

UNIT-III (11 Hrs.)

Multi Input System Controller Design: System Controllers, Design Phases And System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position And Detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, State Assignment, Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations, Programmable System Controllers, ROM, PLA And PAL Based Design.

UNIT-IV (12 Hrs.)

Asynchronous Finite State Machines: Scope, Asynchronous Analysis, Design of Asynchronous Machines, Cycle and Races, Plotting and Reading The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method, Electromagnetic Interference And Electromagnetic Compatibility Grounding And Shielding of Digital Circuits. Interfacing digital system with different media like fiber cable, co-axial cable etc.

REFERENCE BOOKS

1. An Engineering Approach to Digital Design by Fletcher, PHI, 1990
2. Designing with TTL Circuits by Texas Instruments.
3. Related IEEE/IEE publications

SOFT COMPUTING

Subject Code: MECE3-159 **LT PC** **Duration: 45 Hrs.**

4 0 0 4

UNIT – I (12 Hrs.)

Soft Computing: Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Fuzzy Logic: Fuzzy set versus crisp set, basic concepts of fuzzy sets, membership functions, basic operations on fuzzy sets and its properties. Fuzzy relations versus Crisp relation,

Fuzzy rule base system: Fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, Fuzzy Inference Systems (FIS) – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models, Fuzzification and Defuzzification, fuzzy decision making & Applications of fuzzy logic.

UNIT – II (13 Hrs.)

Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN and its applications. Neural Network architecture: Single layer and multilayer feed forward networks and recurrent networks. Learning rules and equations: Perceptron, Hebb's, Delta, winner take all and out-star learning rules. Supervised Learning Network: Perceptron Networks, Adaptive Linear Neuron, Multiple Adaptive Linear Neuron, Back Propagation Network, Associative memory networks, Unsupervised Learning Networks: Competitive networks, Adaptive Resonance Theory, Kohnen Self Organizing Map

UNIT – III (12 Hrs.)

Genetic Algorithm: Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modelling: selection operator, cross over, mutation operator, Stopping Condition and GA flow, Constraints in GA, Applications of GA, Classification of GA.

UNIT – IV (8 Hrs.)

Hybrid Soft Computing Techniques: An Introduction, Neuro-Fuzzy Hybrid Systems, Genetic Neuro-Hybrid systems, Genetic fuzzy Hybrid and fuzzy genetic hybrid systems

TEXT BOOKS

1. S, Rajasekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications", PHI Publication, 2011
2. S.N. Sivanandam & S.N. Deepa, "Principles of Soft Computing", Wiley Publications, 2007

REFERENCE BOOKS

1. Michael Negnevitsky, "Artificial Intelligence", Pearson Education, New Delhi, 2008.
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Wiley, 2010
3. Bose, Neural Network fundamental with Graph, Algo & Appl, TMH
4. Kosko: Neural Network & Fuzzy System, PHI Publication
5. Klir &Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli., PHI Pub.
6. Hagen, Neural Network Design, Cengage Learning

DIGITAL FILTER DESIGN & APPLICATIONS

Subject Code: MECE3-160 **LT PC** **Duration: 45 Hrs.**

4 0 0 4

UNIT I (11 Hrs.)

LTI Systems & Transform LTI systems as frequency selective filters. Inevitability of LTI systems. Minimum phase, maximum phase and mixed phase systems. All-pass filters. Design of digital filters by placement of poles and zeros. DFT as a linear transformation. Linear filtering methods based on DFT. Frequency analysis of signals using DFT. Discrete cosine transform.

UNIT II (11 Hrs.)

Design of FIR filters Introduction-Specifications-Coefficient Calculation Methods-Window, Optimal and Frequency sampling methods Comparison of different Methods-Realization Structures-Finite word length Effects-Implementation Techniques Application examples. FIR filter design with Matlab or Octave. Implementation of FIR filtering in general purpose digital signal processors.

UNIT III (12 Hrs.)

Design of IIR filter: Introduction-Specifications. Coefficient calculation methods-Pole zero placement, Impulse invariant, Matched Z transform and Bilinear Z transform (BZT). Design using BZT and classical analog filters. IIR filter coefficients by mapping S plane poles and zeros. Realization structures-Finite word length effects Implementation techniques. Application examples. IIR filter design with Matlab or Octave. Implementation of IIR filtering in general purpose digital signal processors.

UNIT IV (11 Hrs.)

Adaptive Digital Filters: Concepts -Wiener filter, LMS adaptive algorithm, Recursive least squares algorithm, Lattice Ladder filters. Application of Adaptive filters. Power Spectrum Estimation: Estimation of spectra from finite-duration signals. Non-parametric and Parametric methods for Power Spectrum Estimation.

TEXT BOOKS:

1. Emmanuel C. I. feachor, Barrie W. Jervis, Digital Signal Processing, A practical Approach, 2/e, Pearson Education.

2. Proakis, Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications, 4/e, Pearson Education.

3. Johnny R. Johnson, Introduction to Digital Signal Processing, PHI,1992(1st Edition).

4. Ashok Ambardar, Digital Signal Processing: A Modern Introduction, Thomson, IE, 2007 (1st Edition).

REFERENCE BOOKS:

1. Robert J. Schilling, Sandra L. Harris, Fundamentals of Digital Signal Processing using MATLAB, Thomson, 2005 (1st Edition).

2. Ingle, Proakis, Digital Signal Processing Using MATLAB, Thomson, 1/e 4. Jones D. Digital Filter Design [Connexions Web site]. June 9, 2005.

OPTOELECTRONICS

Subject Code: MECE3-161 **LT PC** **Duration: 45 Hrs.**
4 0 0 4

UNIT-I (11 Hrs.)

Nature of light, light sources, black body, colour temperature, units of light, radio metric and photometric units, basic semiconductors, PN junction, carrier recombination and diffusion, injection efficiency, heterojunction, internal quantum efficiency, external quantum efficiency, double hetero junction, fabrication of heterojunction, quantum wells and super lattices.

UNIT-II (11 Hrs.)

Optoelectronic devices, Optical modulators, modulation methods and modulators, transmitters, optical transmitter circuits, LED and laser drive circuits, LED-Power and efficiency, double hereostructure LED, LED structures, LED characteristics, laser modes, strip geometry, gain guided lasers, index guided lasers.

UNIT-III (11 Hrs.)

Modulation of light, birefringence, electro-optic effect, Electro-Optic materials and applications, Kerr modulators, scanning and switching, self-electro-optic devices, Magneto-Optical devices, Acousto-Optic devices, Acousto-Optic modulators.

UNIT-IV (12 Hrs.)

Display devices, Photoluminescence, cathodoluminescence, EL display, LED display, drive circuitry, plasma panel display, liquid crystals, properties, LCD displays, numeric displays.

Photo detectors, thermal detectors, photoconductors, detectors, photon devices, PMT, photodiodes, photo transistors, noise characteristics of photo-detectors, PIN diode, APD characteristics, Design of detector arrays, CCD, Solar cells. .

TEXT AND REFERENCE BOOKS:

1. Optoelectronics: An Introduction by John Wilson and J. F. B. Hawkes, Prentics-Hall India, 1996
2. Optical Fibre Communication by J. M. Senior, Prentice Hall India, 1985
3. Optical Fibre Communication Systems by J. Gowar, Prentice Hall, 1995
4. Introduction to Optical Electronics by J Palais, Prentice Hall, 1988
5. Semiconductor Optoelectronics by Jasprit Singh, McGraw-Hill, 1995
6. Semiconductor Optoelectronic Devices by P. Bhattacharya, PHI, 1995
7. Fibre Optics and Optoelectronics by R. P. Khare, Oxford University Press, 2004

HARDWARE DESCRIPTION LANGUAGE AND VLSI DESIGN

Subject Code: MECE3-162 **LT PC** **Duration: 45 Hrs.**
4 0 0 4

UNIT I (11 Hrs.)

MOS TRANSISTOR THEORY: Introduction, Ideal I-V Characteristics, Second Order Effects, CMOS Logic, CMOS Fabrication and Layout, VLSI Design Flow.
CIRCUIT CHARACTRIZATION AND PERFORMANCE ESTIMATION: CMOS Inverter, DC Transfer Characteristics, Delay Estimation, Logical Effort, Power Dissipation, Scaling and Latch-up.

UNIT II (11Hrs.)

COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN: Static CMOS, Ratioed Circuits, Differential Cascode Voltage Switch Logic, Dynamic Circuits, Domino Logic-Pass Transistor Circuits, CMOS D Latch and Edge Triggered Flip-flop and Schmitt trigger.

UNIT-III (12 Hrs.)

HDL PROGRAMMING USING BEHAVIORAL AND DATA FLOW MODELS: Verilog, Introduction, Typical Design Flow, Modules and Ports, Instances, Components, Lexical Conventions, Number Specification, Strings, Identifiers and Keywords, Data Types, System Tasks and Compiler Directives, Behavioral Modeling, Dataflow Modeling, RTL, Gate Level Modelling, Programs for Combinational and Sequential.

UNIT-IV (11Hrs.)

HDL PROGRAMMING WITH STRUCTURAL AND SWITCH LEVEL MODELS: Tasks and Functions, Difference between Tasks and Functions, Switch Level, MOS Switches, CMOS Switches, Examples: CMOS NAND and NOR, MUX using Transmission Gate, CMOS Flip-Flop.

TEXT/REFERENCE BOOKS:

1. CMOS VLSI Design (3rd Edition) by Neil H.E. Weste, David Harris and Ayan Banenjee, Pearson,2004
2. CMOS Digital Integrated Circuits (3rd Edition) by Sung Mu Kang and Yusuf Leblebici, Tata Mc-Graw Hill, 2002
3. Verilog HDL (2nd Edition) by Samir Palnitkar, Pearson, 2004

CRYPTOGRAPHY AND NETWORK SECURITY

Subject Code: MECE3-163 **LT PC** **Duration: 45 Hrs.**

4 0 0 4

UNIT-1 (11 Hrs.)

Symmetric Ciphers: Provides a survey of symmetric encryption, including classical and modern algorithms. The emphasis is on the two most important algorithms, the Data Encryption Standard (DES) and the Advanced Encryption Standard (AES). This part also covers the most important stream encryption algorithm, RC4, and the important topic of pseudorandom number generation.

UNIT-II (11 Hrs.)

Asymmetric Ciphers & Cryptographic Data Integrity Algorithms: Provides a survey of public-key algorithms, including RSA (Rivest-Shamir-Adelman) and elliptic curve,a survey of cryptographic hash functions. This part then covers two approaches to data integrity that rely on cryptographic hash functions: message authentication codes and digital signatures.

UNIT-III (12 Hrs.)

Mutual Trust & Network Security and Internet Security: Covers key management and key distribution topics and then covers user authentication techniques. Examines the use of cryptographic algorithms and security protocols to provide security over networks and the Internet.Topics covered include transport-level security, wireless network security, e-mail security, and IP security.

UNIT-IV (11 Hrs.)

System Security & Legal and Ethical Issues: Deals with security facilities designed to protect a computer system from security threats, including intruders, viruses, and worms. This part also looks at firewall technology. Deals with the legal and ethical issues related to computer and network security.

TEXTBOOK AND REFERENCES:

1. William Stallings, “Cryptography and Network Security Principles and Practice” , Prentice hall , Edition 5th, **2005.**