**M.D.UNIVERSITY, ROHTAK (HARYANA)**
**SCHEME OF STUDIES & EXAMINATION FOR MASTER OF TECHNOLOGY COURSE IN ELECTRONICS & COMPUTER ENGINEERING**

**SEMESTER-I**

| Sr.No. | Course No. | Course No. | Teaching Schedule | | | Marks | | | Credits | | | Durat-ion of Exam |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Sessional | Exam | Total | Sessional | Exam | Total | |
| 1 | MEECE-101 | Modern Digital Communication Techniques | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 2 | MTCST-103 | Data Structure and Algorithm | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 3 | MTCST-304 | Advanced Computer Architecture | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 4 | MEECE-110 | Semiconductor Device Modeling & Simulation | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 5 | MEECE-107 | Digital Integrated Circuit Design | 4 | - | | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 6 | MEECE-111 | Communication System Engineering Lab | - | - | 3 | 50 | 50 | 100 | 2 | 2 | 4 | 3 |
| 7 | MTCST-107 | DSA Lab | - | - | 3 | 50 | 50 | 100 | 2 | 2 | 4 | 3 |
| | **TOTAL** | | 20 | | 6 | 350 | 600 | 950 | 14 | 24 | 38 | |

**NOTE:**

1. The paper setter shall set each theory paper of 100 marks covering the entire syllabus and the same will be evaluated on marks.
2. The Sessionals of Theory/Practical Courses shall also be evaluated on the basis of marks.
3. The choice of students for any elective shall not be binding on the Deptt. To offer it.

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**SEMESTER-II**

| Sr.No. | Course No. | Course No. | Teaching Schedule | | | Marks | | | Credits | | | Duration of Exam |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Sessional | Exam | Total | Sessional | Exam | Total | |
| 1 | MEECE-203 | ADA | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 2 | MEECE-202 | Radar System Engineering | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 3 | MEECE-204 | Wireless sensor Network | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 4 | | Elective-I | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 5 | MEECE-208 | Design & Simulation Lab | - | - | 3 | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 6 | MTCST-206 | Seminar on Advanced Topics | - | - | 2 | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| | **TOTAL** | | 20 | | 5 | 300 | 600 | 900 | 12 | 24 | 36 | |

ELECTIVE –I

1. Simulation & Modeling (MEECE-205)
2. ASIC & SOC Design (MEECE-206)
3. Internet & Web Technology (MEECE-207)
4. Artificial Neural Network (MTCST-313)
5. Cellular & Mobile Communication (MTCST-305)
6. Computer Software Testing (MTCST-211)
7. Digital Image Processing (MEECE-203)
8. Advanced Database System (MTCST-104)

**NOTE:**

1. The paper setter shall set each theory paper of 100 marks covering the entire syllabus and the same will be evaluated on marks .
2. The Sessionals of Theory/Practical Courses shall also be evaluated on the basis of marks.
3. The choice of students for any elective shall not be binding on the Deptt. To offer it.

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**SEMESTER-III**

| Sr.No. | Course No. | Course No. | Teaching Schedule | | | Marks | | | Credits | | | Duration of Exam |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Sessional | Exam | Total | Sessional | Exam | Total | |
| 1 | MTCST-301 | Artificial Intelligence | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 2 | MEECE-303 | Optimization Techniques | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 3 | | Elective -II | 4 | - | - | 50 | 100 | 150 | 2 | 4 | 6 | 3 |
| 4 | MEECE-304 | Dissertation (Phase-I) | - | - | 4 | | 100 | 100 | 4 | - | 4 | - |
| 5 | MEECE-305 | Project | - | - | 4 | 50 | 50 | 100 | 2 | 2 | 4 | 3 |
| 6 | MEECE-306 | Seminar | - | - | 2 | 50 | - | 50 | 2 | | 2 | |
| | **TOTAL** | | 12 | | 10 | 250 | 450 | 700 | 14 | 14 | 28 | |

Elective -II

1. Data Mining (MTCST-314)
2. Fuzzy Logic and Design (MTCST-317)
3. Object Oriented Systems (MTCST-102)
4. Information Theory, Coding & cryptography (MEECE-102)
5. Research Methodology (MEECE-302)

**NOTE:**

1. The paper setter shall set each theory paper of 100 marks covering the entire syllabus and the same will be evaluated on marks.
2. The Sessionals of Theory/Practical Courses shall also be evaluated on the basis of marks.
3. The choice of students for any elective shall not be binding on the Deptt. To offer it.

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**SEMESTER-IV**

| Sr.No. | Course No. | Course No. | Teaching Schedule | | | Examination Schedule (Marks) | | | | Duration of Exam |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | P | Total | Class Theory | Theory | Practical | Total | |
| 1 | MTCST-401 | Dissertation | - | 20 | 20 | 300 | 0 | 450 | 750 | 3 |

MEECE-101 **Modern Digital Communication Techniques**

| L | T | P |
|---|---|---|
| 4 | - | - |

| | | Marks | Credit |
|---|---|---|---|
| Exam | : | | |
| Theory | : | 100 | 4 |
| Sessional | : | 50 | 2 |
| Total | : | 150 | 6 |
| Duration of Exam | : | 3hrs. | |

**Unit-1 Deterministic & Random Signal Analysis**

Bandpass & Lowpass Signals, Lowpass Equivalent of Bandpass Signals, Energy Considerations, Lowpass Equivalent of a Bandpass System. Vector Space Concepts, Signal Space Concepts, Orthogonal Expansions of Signals, Gram-Schmidt Procedure. Bounds on Tail Probabilities, Limit Theorems for Sum of Random Variables. Complex Random Vectors. WSS Random Process, Cyclostationary Random Process, Proper and Circular Random Process, Markov Chains. Sampling Theorem for Band-limited Random Process, The Karhunen-Loeve Expansion. Banpass and Lowpass Random Processes.

**Unit-2 Digital Modulation Scheme**

Representation of Digitally Modulated Signals, Memoryless Modulation Methods; Pulse Amplitude Modulation, Phase Modulation, Quadrature Amplitude Modulation, Multidimensional Signaling. Signaling Schemes With Memory; Continuous-Phase Frequency-Shift Keying, Continuous-Phase Modulation. Power Spectrum of Digitally Modulated Signals; Power Spectral Density of a Digitally Modulated Signal With Memory, Power Spectral Density of Linearly Modulated Signals, Power Spectral Density of Digitally Modulated Signals With Finite Memory, Power Spectral Density of Modulated Schemes With a Markov Structure, Power Spectral Density of CPFSK and CPM Signals.

**Unit-3 Optimum Receivers for AWGN Channels**

Waveform and Vector Channel Models; Optimum Detection for a General Vector Channel. Waveform and Vector AWGN Channels; Optimal Detection for the Vector AWGN Channel, Implementation of the Optima Receiver for the AWGN Channels. Optimal Detection and Error Probability for ASK, PAM,PSK AND QAM Signaling.

**Unit-4 Carrier and Symbol Synchronization**

Signal Parameter Estimation; The Likelyhood Function, Carrier Recovery and Symbol Synchronization in Signal Demodulation. Carrier Phase Estimation; Maximum Likelyhood Carrier Phase Estimation, The Phase-Locked Loop, Effect of Additive Noise in the Phase Estimate. Symbol Timing Estimation; Maximum Likelyhood Timing Estimation.

**Unit-5 Digital Communication Through Band-Limited Channels**

Characterization of Band-Limited Channels. Signal Design for Band-Limited Channels; Design of Band-Limited Signals for No Intersymbol Interference-The Nyquist Criterion, Optimum Maximum-Likelihood Receiver.

**Unit-6 Multichannel and Multicarrier Systems**

Multichannel Digital Communications in AWGN Channels; Binary Signals, M-ary Orthogonal Signals. Multicarrier Communications; Single Carrier verses Multicarrier Modulation, Capacity of a Nonideal Linear Filter Channel, OFDM, Modulation & Demodulation in an OFDM, An FFT Algorithm Implementation of an OFDM System

**Unit-7 Spread Spectrum Signals for Digital Communication**

Model of Spread spectrum Digital Communication System. Direct Sequence Spread Spectrum

Signals; Error Rate Performance of the Decoder, Some Applications of DS Spread Spectrum Signals. Frequency-Hopped Spread-Spectrum Signals; Performance of FH Spread Spectrum Signals in an AWGN Channel, A CDMA System Based on FH Spread Spectrum Signals.

**Text Book**

1. John G. Proakis and Masoud Salehi, ***Digital Communication***, McGraw-Hill, 5th Edition

**Reference Books**

1. Simon Haykin, ***Digital Communication***, willy
2. Tube & Schilling, ***Principle of Communication***, PHI

**MTCST-103 DATA STRUCTURES AND ALGORITHMS**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Introduction**: Overview of C++ classes, pointers, parameters passing, templates.

**2. Fundamentals of algorithm analysis:** Big 'O' notations, Time and space complexity of algorithms, Elementary data structures and their applications

**3. Arrays:** ordered lists, representation of arrays, sparse matrices, linked lists: singly and doubly linked lists, stacks, queues, multiples stacks and queues, Applications: polynomial arithmetic, infix, postfix and prefix arithmetic expression conversion and evaluations.

**4. Lists, Stacks & Queues:** Abstract Data Types, Representation & implementation of linked list, Doubly linked list, Circular linked lists, Stacks, array representation of stack. Applications of stacks. Queues, array representation of Queues, Circular queues, Deques, priority queues, Applications of Queues.

**5. Trees**: Introduction to trees, binary trees, representation and traversal of trees, operations on binary trees, types of binary trees, threaded binary trees, B Trees, AVL Trees, Application of trees.

**6. Graphs:** Representation, traversal, connected components, shortest path and transitive closure, topological sort, activity network, critical path, path enumeration. Dijkstra's Algorithm, Floyd Warshall's Algorithm, Minimum Spanning Tree Definitions.

**7. Searching & Sorting:** searching techniques, Hash function, Hash table, Internal sort: Radixsort, Insertion sort, Exchange sort, Selection sort, Quicksort, Mergesort, Heaport, External sort: K-way mergesort, balanced mergesort.

**8. Files:** Files, Queries and sequential organization; Cylinder surface indexing, Hashed Indexed, Tree Indexing, Sequential file organizational, random file organization, Hashed file organization, Inverted files, cellular partitions.

**Text Books:**


1. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Booksource Pvt. Ltd, 1999.
2. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss. Second edition, Pearson Edition. Asia.
3. Data Structures using C by A.M.Tenenbaum, Langsam, Moshe J. Augentem, PHI pub.


**References Books:**


1. Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low Priced Edition.
2. Y. Langsam et. al., "Data Structures using C and C++", PHI, 1999.
3. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline, TMH

**MTCST-304 ADVANCED COMPUTER ARCHITECTURE**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Parallel computer models:** The state of computing, Classification of parallel computers, Multiprocessors and Multicomputers, Multivector and SIMD computers.

**2. Program and network properties:** Conditions of parallelism, Program partitioning and scheduling, Program flow mechanisms, System Interconnect Architectures.

**3. Principles of Scalable Performance:** Performance Metrics and Measures, Parallel processing applications, speedup performance laws, scalability analysis and approaches.

**4. Processors and Memory Hierarchy:** Advanced processor technology, Superscalar and Vector Processors, Vector processing principles, Memory hierarchy technology, virtual memory technology.

**5. Pipelining & Superscalar Techniques:** Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Arithmetic Pipeline Design, Superscalar and Super pipeline design.

**6. Parallel & Scalable architectures:** Multiprocessor system Interconnects, Cache coherence and synchronization mechanisms, message passing mechanisms, latency hiding techniques, principles of multithreading, scalable and multithreaded architecture

**Text Books:**

1. Kai Hwang, “Advanced computer architecture”; TMH. 2000

**Reference Books:**

1. J.P.Hayes, “Computer Architecture and organization”; MGH. 1998
2. V.Rajaranam & C.S.R.Murthy, “Parallel computer”; PHI. 2002
3. Stalling W, “Computer Organisation & Architecture”, PHI. 2000
4. M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”; Narosa Publishing. 1998
5. Hwang and Briggs, “Computer Architecture and Parallel Processing”; MGH. 1999

MEECE-110 **Semiconductor Device Modeling & Simulation**

| L | T | P |
|---|---|---|
| 4 | - | - |

| | | Marks | Credit |
|---|---|---|---|
| Exam | : | | |
| Theory | : | 100 | 4 |
| Sessional | : | 50 | 2 |
| Total | : | 150 | 6 |
| Duration of Exam | : | 3hrs. | |

**Unit-1**

Semiconductor Electronics Review:

Elements of Semiconductor Physics, Physical Operation of a PN Junction, MOS Junction, MS Junction PN–Junction Diode and Schottky Diode: DC Current-Voltage Characteristics, Static Model, Large-Signal Model, Small-Signal Model, Schottky Diode and its Implementation in SPICE2, Temperature and Area Effects on the Diode Model Parameters, SPICE3, HSPICE and PSPICE Models

**Unit-2**

Bipolar Junction Transistor (BJT):

Transistor Convention and Symbols, Ebers-Moll Static Model, Ebers-Moll Large-Signal Model, Ebers-Moll Small-Signal Model, Gummel-Poon Static Model, Gummel-Poon Large-Signal Model, Gummel-Poon Small-Signal Model, Temperature and Area Effects on the BJT Model Parameters, Power BJT Model, SPICE3, HSPICE and PSPICE Models

**Unit-3**

Junction Field-Effect Transistor (JFET): Static Model, Large-Signal Model and its Implementation in SPICE2, Small-Signal Model and its Implementation in SPICE2, Temperature and Area Effects on the JFET Model Parameters, SPICE3, HSPICE and PSPICE Models

**Unit-4**

Metal-Oxide-Semiconductor Transistor (MOST): Structure and Operating Regions of the MOST, LEVEL1 Static Model, LEVEL2 Static Model, LEVEL1 and LEVEL2 Large-Signal Model, LEVEL3 Static Model, LEVEL3 Large-Signal Model, The Effect of Series Resistances, Small-Signal Models, The Effect of Temperature, BSIM1, BSIM2, SPICE3, HSPICE and PSPICE Models

**Unit-5**

BJT Parameter Measurements: Input and Model Parameters, Parameter Measurements MOST Parameter Measurements: LEVEL1 Model Parameters, LEVEL2 Model (Long-Channel) Parameters, LEVEL2 Model (Short-Channel) Parameters, LEVEL3 Model Parameters, Measurements of Capacitance, BSIM Model Parameter Extraction

**Unit-6**

Noise and Distortions: Noise, Distortion Metal-Semiconductor Field-Effect Transistor (MESFET), Ion-Sensitive Field-Effect Transistor (ISFET) and Semiconductor-Controlled Rectifier (Thyristor): The MESFET, The ISFET, The Thyristor

**Reference Books:**

1. Paolo Antognetti and Giuseppe Massobrio, Semiconductor Device Modeling with SPICE, 2nd edn., McGraw-Hill, New York, 1993, ISBN 0071349553 (paperback) or 007 0024693 (hardback).

**Text Books**:

1. Richard S. Muller, Theodore I. Kamins, and Mansun Chan, Device Electronics for Integrated Circuits, 3rd edn., John Wiley and Sons, New York, 2003. ISBN: 0-471-59398-

2. H. Craig Casey, Devices for Integrated Circuits: Silicon and III-V Compound Semiconductors, John Wiley, New York, 1999. Listed as DI

3. Dieter K. Schroder, Semiconductor Material and Device Characterization, John Wiley and Sons, New York, 1990. Listed as S

MEECE-106 **Digital Integrated Circuit Design**

| L | T | P |
|---|---|---|
| 4 | - | - |

| | | Marks | Credit |
|---|---|---|---|
| Exam | : | | |
| Theory | : | 100 | 4 |
| Sessional | : | 50 | 2 |
| Total | : | 150 | 6 |
| Duration of Exam | : | 3hrs. | |

**Unit-1**

Introduction, Design Metrics and Manufacturing Process:

A Historical Perspective, Issues in Digital Integrated Circuit Design, Quality Metrics of a Digital Design, Introduction to Manufacturing Process, Manufacturing CMOS Integrated Circuits, Design Rules – The Contract between Designer and Process Engineer, Packaging Integrated Circuits

**Unit-2**

The Devices: Introduction, The Diode, The MOS(FET) Transistor, The Wire, Interconnect Parameters – Capacitance, Resistance, and Inductance, Electrical Wire Models, SPICE Wire Models

**Unit-3**

The CMOS Inverters and CMOS Logic Gates – the Static View:

Introduction to CMOS Inverter, The Static CMOS Inverter – An Intuitive Perspective, Evaluating the Robustness of the CMOS Inverter, Introduction to Static CMOS Design, Complementary CMOS, Ratioed Logic, Pass-Transistor Logic CMOS Inverter – the Dynamic View:

Performance of CMOS Inverter: The Dynamic Behavior, Power, Energy, and Energy-Delay, Perspective: Technology Scaling and its Impact on the Inverter Metrics

**Unit-4**

Dynamic CMOS Logic, Timing Metrics: Dynamic CMOS Design, CMOS Logic Design Perspectives, Timing Metrics: Timing Metrics for Sequential Circuits, Classification of Memory Elements

**Unit-5**

Static and Dynamic Sequential Circuits:

Static Latches and Registers, Dynamic Latches and Registers, Alternative Register Styles: Pulse Registers and Sense-Amplifier Based Registers, Pipelining: An Approach to Optimize Sequential Circuits – Latch Vs Register-Based Pipelines and NORA-CMOS – A Logic Style for Pipelined Structures, Nonbistable Sequential Circuits Coping with Interconnect:

**Unit-6**

Introduction, Capacitive Parasitics, Resistive Parasitics, Inductive Parasitics, Advanced Interconnect Techniques, Networks-on-a-Chip

Timing Issues in Digital Circuits: Introduction, Timing Classification of Digital Systems, Synchronous Design – An In-depth Perspective, Self-Timed Circuit Design, Synchronisers and Arbiters, Clock Synthesis and Synchronisation Using a Phase-Locked Loop,

**Unit-7**

Future Directions and Perspectives Designing Arithmetic Building Blocks: Introduction, Data paths in Digital Processor Architecture, The Adder, The Multiplier, The Shifter, Other Arithmetic Operators, Power and Speed Trade-off's in Datapath Structures, Perspective: Design as a Trade-off

Designing Memory and Array Structures:

**Unit-8**

Introduction, The Memory Core, Memory Peripheral Circuitry, Memory Reliability and Yield, Power Dissipation in Memories, Case Studies in Memory Design: The PLA, A 4-Mbit SRAM and A 1-Gbit NAND Flash memory, Perspective: Semiconductor Memory Trends and Evolution Validation and Test of Manufactured Circuits: Introduction, Test Procedure, Design for Testability, Test Pattern Generation

**Reference Books:**

1. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, Digital Integrated Circuits – A Design Perspective, 2nd edn., Pearson Education, 2003.
2. K. Eshraghian, and N.H.E. Weste, Principles of CMOS VLSI Design – a Systems Perspective, 2nd edn., Addison Wesley, 1993.
3. Wayne Wolf,Modern VLSI Design System–on–Chip Design, 3rd edn,Pearson Ed, 2003.
4. M. Michael Vai, VLSI Design, CRC Press, 2001.
5. John P. Uyemura, CMOS Logic Circuit Design, Springer (Kluwer Academic Pub), 2001.
6. Ken Martin, Digital Integrated Circuit Design, Oxford University Press, 2000.

MEECE-111 **Communication System Engineering Lab**

| L | T | P | | | Marks | Credit |
|---|---|---|---|---|---|---|
| - | - | 3 | Exam | : | 50 | 2 |
| | | | Sessional | : | 50 | 2 |
| | | | Total | : | 100 | 4 |
| | | | Duration of Exam : | | 3hrs. | |

LIST OF EXPERIMENTS:

1. Study of Amplitude Modulation and determination of Modulation index.

2. Study of Frequency Modulation and determination of Modulation index.

3. Study of Phase Modulation.

4. Study of Pulse Amplitude Modulation.

5. Study of Pulse Width Modulation.

6. Study of Pulse Frequency Modulation.

7. Study of Pulse Code Modulation.

8. Study of frequency Shift Keying.

9. Study of MSK and QASK.

10. Study of PSK and QPSK.

11. Project related to the scope of the course.

NOTE: Atleast ten experiments are to be performed , atleast seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

**MTCST 106**

**Data Structure & Algorithm Lab**

| L | T | P |
|---|---|---|
| 0 | 0 | 2 |

Practical based on theory paper Data Structure & Algorithm.

**MTCST-203 ANALYSIS AND DESIGN OF ALGORITHMS**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Introduction:** Analyzing algorithms, Designing algorithms, asymptotic notation, Standard notations and common functions, the substitution method, the recursion tree method, the master method.

**2. Sorting and Order statistics:** Heaps- maintaining the heap property, building a heap, The heapsort algorithm, description of quick sort, performance of quicksort, Analysis of quicksort, Lower bounds for sorting-Counting sort, Radix sort, Bucket sort.

**3. Dynamic Programming:** Assembly-line scheduling, Matrix chain multiplication-elements of dynamic programming, longest common subsequence, optimal binary search trees.

**4. Greedy algorithms:** An activity selection problem, Elements of greedy strategy, Huffman codes, a task scheduling problem.

**5. Graph algorithms:** Representation of graphs, Breadth first search, Depth first search, Topological sort, strongly connected components, Growing a minimum spanning tree-Kruskal and Prims algorithms, Single source shortest paths in directed acyclic graphs-The Bellman-Ford Algorithm, Dijkstra's Algorithm. All pairs shortest paths and matrix multiplication- The Floyd-Warshall algorithm, Johnson's algorithm for sparse matrices.

**6. NP-completeness:** Polynomial time and its verification-NP-completeness-reducibility-proofs and NP-complete problems- The vertex cover problem, The travelling salesman's problem, The set cover problem-Randomization and linear programming, The subset-sum problem.

**7. String Matching:** the naïve string matching algorithm, the Rabin Karp algorithm, string matching with finite automata, the Knuth-Morris-Pratt algorithm.

**Text Book:**

1. Introduction to Algorithms, by Thomas H. Corman, Charles E. Leiserson, Ronald R. Rivest & Clifford Stein, Prentice Hall of India, New Delhi, New Delhi.

**Reference Books:**

1. The Design and Analysis of computer Algorithms, by Aho, Hopcroft & Ullman, Pearson Education.
2. Algorithm Design by Michel T. Goodrich & Roberto Tamassia, John Weily and Sons.
3. Fundamentals of sequential and parallel algorithms, by Kenneth A. Berman & Jerome L. Paul, Vikas Publishing House.

MEECE-202 **RADAR SYSTEM ENGINERRING**

| L | T | P |
|---|---|---|
| 4 | - | - |

| | Marks | Credit |
|---|---|---|
| Exam : | | |
| Theory : | 100 | 4 |
| Sessional : | 50 | 2 |
| Total : | 150 | 6 |
| Duration of Exam : | 3hrs. | |

**Unit-1**

The radar equation in terms of the key radar parameters and target-radar cross section. False alarm, minimum detectable signal, Receiver noise and the SNR. Probabilities of detection and False alarm, integration of radar pulses, radar cross section of targets; complex targets, transmitted power, prf, antenna parameters, beam shape, cosecant-squared antenna pattern; basic ideas on system losses MTI and pulse doppler radar, delay line canceller, doppler effect on blind speeds in MTI, staggered prf. doppler filter banks, digital MTI processing, Limitations to MTI performance MTI from a moving platform (AMTI), pulse doppler radar, FM-CW radar for range and velocity determination, SLAR & SAR

**Unit-2**

Tracking with radar, monopulse tracking, amplitude comparison monopulse, phase-comparison monopulse, conical scan and sequential lobing, Glint (example from a simple target model) tracking in range. Target acquisition, servo system tracking in doppler, track with scan (limited sector scan), Automatic tracking with surveillance Radars.

**Unit-3**

Functions of the radar antenna, antenna radiation pattern, effective aperture and aperture illumination, side lobe radiation, reflector antennas, grain antenna, Electronically steered phased-array antennas, Beam steering and array-feed networks, change of beam width with steering angle, phase shifters, diode phase shifters, ferrite phase shifters;

**Unit-4**

Frequency-scan arrays, bandwidth limitation, transmission lines for frequency scan. Radiators and architectures for phased arrays, effect of errors on radiation patens, errors in arrays, adaptive antennas array. General ideas on radar transmitters (RF power sources) and super heterodyne radar receiver, radar displays, scan converter, displexer and receiver protectors.

**TEXT BOOK**

1. Introduction to Radar system (3rd Edition); Merrill L. Skolnik Tata McGraw Hill publishing Ltd.

**REFERENCE BOOKS**

1. Ridenour, L. N. Radar System Engineering, MIT radiation laboratory series, Vol. I & II, New York: Mc Graw Hill 1047.
2. Krous, J. D. Antennas, 2nd Edition. Mc Graw Hill, 1988
3. Nathanson, F. E. Radar Design Principle, 2nd Edition, Mc Graw Hill, 1991 (N.Y.)

MEECE-204 **Wireless Sensor Network**

| L | T | P |
|---|---|---|
| 4 | - | - |

| | | Marks | Credit |
|---|---|---|---|
| Exam | : | | |
| Theory | : | 100 | 4 |
| Sessional | : | 50 | 2 |
| Total | : | 150 | 6 |
| Duration of Exam | : | 3hrs. | |

**Unit-1**

Introduction to wireless sensor network: Application and Motivation, Network Performance objective, Development of Wireless Sensor Network; Canonical Problem Localization and Tracking: Tracking Multiple Objects, State space decomposition, Data association, Sensor Models, Performance Comparison and Metrics;

**Unit-2**

Networking Sensors: The S MAC Protocol,IEEE 802.15.4 Standard and ZigBee , Routing in sensor network; Infrastructure Establishment: Topology Control, Clustering, Time Synchronization, Clocks and Communication Delays, Sensor Tasking and Control;

**Unit-3**

Sensor Network Databases: Sensor Database Challenges, Querying The Physical Environment, Query Interfaces, Cougar sensor database and abstract data types, Probabilistic queries, High level Database Organization, In Network Aggregation, Query propagation and aggregation, TinyDB query processing, Query processing scheduling and optimization, Data Centric Storage. Special topics in wireless sensor networks.

**Text Book:**

1. F. Zhao and L. Guibas, Wireless Sensor Network: Information Processing Approach, Elsevier.
2. E. H. Callaway, Jr. E. H. Callaway, Wireless Sensor Networks Architecture and Protocols: CRC Press.

**Reference Books:**

1. A. Hac, Wireless Sensor Network Designs, John Wiley & Sons

**MEECE-208 DESIGN & SIMULATION LAB**

| L | T | P | | Marks | Credit |
|---|---|---|---|---|---|
| - | - | 3 | Exam : | 50 | 2 |
| | | | Sessional : | 50 | 2 |
| | | | Total : | 100 | 4 |

LIST OF EXPERIMENTS:

1. Simulate and study half-wave, full-wave, and bridge-rectifier using PSPICE windows
2. Simulate and study diode clipper and clamper circuits using PSPICE windows
3. Simulate and study emitter bias and fixed bias BJT and JFET circuits using PSPICE windows, and determine quiescent conditions.
4. Simulate a common emitter amplifier using self biasing and study the effect of variation in emitter resistor on voltage gain , input and output impedance using PSPICE windows .
5. Determine the frequency response of Vo/Vs for CE BJT amplifier using PSPICE windows. Study the effect of cascading of two stages on band width.
6. Simulate and study Darlington pair amplifier circuit using PSPICE windows and determine dc bias and output ac voltage .
7. Study an operational amplifier using PSPICE windows and find out: CMMR, gain band width product, slew rate, 3-db frequency, and input offset voltage.
8. Simulate and study active low pass, high pass, and band pass filters using PSPICE windows.
9. Simulate and study class A, B, C, and AB amplifier using PSPICE windows.
10. Study the operation of 555 timer oscillator using PSPICE.
11. Simulate logic expression……..and determine its truth table.
12. Simulate logic expression of full adder circuit and determine its truth table.
13. Simulate a synchronous 4-bit counter and determine its count sequence.
14. Simulate a master-slave flip-flop using NAND gates and study its operation. Study the operation of asynchronous preset and clear .

NOTE : At least ten experiments have to be performed in the semester; out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.

**MTCST-206 SEMINAR ON ADVANCED TOPICS**

| | |
|---|---|
| L T P | Class Work Marks: 50 |
| 0 0 2 | Total Marks: 50 |

**Purpose:** To enable a student to be familiar with Communication skills.

Student is expected to learn

a. How to make a presentation
    i. Verbal
    ii. Non Verbal
    iii. LCD based Power Point
b. How to write a report
    i. Abstract
    ii. Body
    iii. Conclusions
    iv. Executive Summary
c. Group Discussion
    i. Share the work with a group
    ii. Modularization of the work
    iii. Shareware Development
d. Communication
    i. Horizontal
    ii. Vertical

- Students will be given a topic of importance and are expected

    a. To present the topic verbally in 30 minutes
    b. To present the topic as a report in 30 pages

**MTCST-301 ARTIFICIAL INTELLIGENCE**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Introduction:** Data, information and knowledge. Model of an intelligent system, Models of knowledge representations: Representation and reasoning in logic. Semantic representations: semantic networks, frames; Frame/ script systems; Conceptual dependency and conceptual graphs, Ontologies.

**2. Knowledge based systems:** Software architecture of a knowledge-based system, Rule-based programming and production systems, Rule chaining and inference control, Inference: reasoning about knowledge, Temporal reasoning, Inference under uncertainty: Bayesian techniques, Fuzzy reasoning, Case-based reasoning.

**3. Machine Learning:**
**Symbol-Based:** Framework for Symbol – Based Learning, Version Space Search, ID3 Algorithm, Un-supervised learning, Reinforcement Learning.
**Connectionist:** Perceptron Learning, Backpropagation Learning, Competitive Learning, Hebbian Coincidence Learning, Attractor Networks.

**4. Advanced Topics of AI Problem Solving:**
**Automated Reasoning:** Weak Methods in Theorem Proving, GPS and Difference Table, Resolution for Theorem Proving, Automated reasoning with PROLOG.
**Understanding Natural Language:** Role of Knowledge, Symbolic Analysis, Syntax, ATN Parsers, Stochastic Tools for Language Analysis, Natural Language Applications.

**Text Books:**


1. "Artificial Intelligence – Structures and Strategies for Complex Problem Solving", George F. Luger, 4th Edition, Pearson Education, 2003.
2. "Artificial Intelligence", Knight, Tata McGraw Hill
3. "Artificial Intelligence 'a Modern Approach" Russell & Norvig, 2nd edition, Pearson Education, 2003.

MEECE-303 **OPTIMIZATION TECHNIQES**

| L | T | P |
|---|---|---|
| 4 | - | - |

| | | Marks | Credit |
|---|---|---|---|
| Exam | : | | |
| Theory | : | 100 | 4 |
| Sessional | : | 50 | 2 |
| Total | : | 150 | 6 |
| Duration of Exam | : | 3hrs. | |

**UNITI**

Introduction to linear Programming: The linear Programming model, Assumption of Linear Programming, Additional Examples,Solving LPPs: The simplex method, the essentials of simplex method, Setting up the simple method, The Algebra of the simplex method, The simplex method in Tabularform. Tie Breaking in simplex method, Adopting to the other model forms.

**UNITII**

Duality theory: Primel Dual Relationships, Other Algorithm for linear programming, The dual simplex method,The Transportation & Assignment Problems: The transportation Problems, A streamlinedsimplex method for the transportation problems, The Assignment Problem.

**UNITIII**

Network optimization Models, The shortest path Problem, the minimum spanning tree problem, the maximum flow problem, the minimum cost flow problem,, The Project Management with PERT/CPM, Scheduling a problem with PERT/CPM, Dealing with uncertain activity durations, considering Time cost TradeOffs, Scheduling and Controlling, Projects costs, An evaluation of PERT/CPM.

**UNITIV**

Game Theory: The formation of Twoperson, Zerosum games, Solving simple games, gameswith mixed strategies, Graphical solution Procedure, Solving by LP.Inventory Theory: Components of inventory models, Deterministic continuous review models, A deterministic periodic review model, A stochastic continuous review model.

**Text Book:**

Hiller and Lieberman, Introduction to Operation Research (Seventh Edition) Tata McGrawHill Publishing Company Ltd

**Reference Books:**

1) Ravindren Philips and Solberg, Operation Research Principles and Practice(Second Edition) John Wiley & Sons.

MEECE-304 **DISSERTATION (PHASE-I)**

| L | T | P | | | Marks | Credit |
|---|---|---|---|---|---|---|
| - | - | 4 | Sessional | : | 100 | 4 |
| | | | Total | : | 100 | 4 |

Every student will carry out dissertation under the supervision of a Supervisor(s). The topic shall be approved by a Committee constituted by the Head of the concerned Deptt. Every student will be required to present two seminar talks, first at the beginning of the Dissertation(Phase-I) to present the scope of the work and to finalize the topic, and second towards the end of the semester, presenting the work carried out by him/her in the semester. The committee constituted will screen both the presentations so as to award the sessional grades out of A, A(-), B, B(-), C, C(-), D & F.A student scoring 'F' grade shall have to improve this grade before continuing his/her Dissertation in the4th semester failing which he/she shall have to repeat the Dissertation (Phase-I) next time in the regular
3rd semester.

MEECE-306 **SEMINAR**

| L | T | P |
|---|---|---|
| - | - | 2 |

| | | Marks | Credit |
|---|---|---|---|
| Exam | : | | |
| Sessional | : | 50 | 2 |
| Total | : | 50 | 2 |

Every student will be required to present a seminar talk on a topic approved by the Deptt. excepton his/her dissertation. The committee constituted by the Head of the Deptt. will evaluate the presentation and will award one of the grades out of A,A(-),B,B(-),C,C(-), D& F.
A Student who is awarded the 'F' grade will be required to repeat the seminar on the same topic.

**MTCST-314 DATA MINING**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Introduction:** Introduction to Data Warehousing and data mining, basic elements of data warehousing, Data warehousing vs. OLAP.

**2. Data model development for Data Warehousing:** business model, selection of the data of interest, creation and maintaining keys, modeling transaction, data warehousing optimization, Data warehousing methodologies, type and comparisons.

**3. Data Mining:** Data mining techniques, data mining algorithms, classification, Decision- Tree based Classifiers clustering, association Association-Rule Mining Information Extraction using Neural Networks, Knowledge discovery, KDD environment.

**4. Visualization:** data generalization and summarization-based characterization, Analytical characterization: analysis of attribute relevance, mining class Comparison, Discriminating between classes, mining descriptive statistical measures in large database.

**5. Data mining primitives, languages & system architectures:** data mining primitives, Query language, designing GUI based on a data mining query language, architectures of data mining systems.

**6. Application and trends in data mining:** Applications, systems products and research prototypes, multimedia data mining, indexing of multimedia material, compression, space modeling.

**7. Advanced topics:** Web mining: web content mining, web structure mining, web usage mining, spatial mining, temporal mining.

**Text books:**


1. Paulraj ponniah, “Web warehousing fundamentals” – John Wiley.
2. M. H. Dunham, “Data mining introductory and advanced topics” – Pearson education
3. Han, Kamber, “Data mining concepts and techniques”, Morgan Kaufmann
4. Imhoff, Galemmo, Geiger, “Mastering data warehouse design”, Wiley dreamtech

**MTCST-317 FUZZY LOGIC & DESIGN**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Classical and Fuzzy Sets:** Overview of Classical Sets, Membership Function, $\alpha$-cuts, Properties of $\alpha$-cuts, Decomposition Theorems, Extension Principle.

**2. Operations on Fuzzy Sets:** Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

**3. Fuzzy Arithmetic:** Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

**4. Fuzzy Relations:** Crisp & Fuzzy Relations, Projections & Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on single set, Equivalence, Compatibility & Ordering Relations, Morphisms, Fuzzy Relation Equations.

**5. Possibility Theory:** Fuzzy Measures, Evidence & Possibility Theory, Possibility versus Probability Theory.

**6. Fuzzy Logic:** Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges, Applications of Fuzzy Logic

**7. Uncertainty based Information:** Information & Uncertainty, Nonspecificity of Fuzzy & Crisp sets, Fuzziness of Fuzzy Sets.

**Text Book:**


1. G.J.Klir, Yuan,"Fuzzy Sets and fuzzy logic, Theory and applications", Prentice Hall India, 1995.


**Reference Books:**


1. John Yen, Reza Langari, "Fuzzy Logic Intelligence, Control and Information", Pearson Education, 2006.
2. Ross, "Fuzzy Logic with Engineering Applications", 2nd Edition, John Wiley, 2004.
3. H. Zimmermann, "Fuzzy Set Theory and its applications", 2nd Edition, Allied Publishers, 1996.

**MTCST-102 OBJECT-ORIENTED SYSTEM**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Introduction:** Overview of object-oriented systems development, objects basics, object-oriented system development life cycle.

**2. UML:** Object-oriented methodologies, Unified modeling language

**3. Analysis:** Object-oriented analysis process: Identifying use cases, Object analysis: classification, Identifying object relationships, attributes and methods

**4. Design:** Object-oriented Design Process and Design Axioms Designing classes,
Access Layer: Object storage and object interoperability.
View Layer: Designing interface objects.

**5. Soft ware Quality Assurance:** Introduction, QA Tests, Testing strategies, Impact of Object orientation on Testing, Test cases, Test Plan, Continous Testing, Myer's Debugging Principles.

**Text Book:**

1. Ali Bahrami: Object-oriented systems Development, McGrawHill, 1999

**Reference Books:**

1. Craig Larman : Applying UML and Patterns, Pearson Education, 2002
2. Grady Booch: Object-oriented analysis and design, Addison – Wesley, 1994

MEECE-102 **Information Theory, Coding and Cryptography**

| L | T | P |
|---|---|---|
| 4 | - | - |

| | | Marks | Credit |
|---|---|---|---|
| Exam | : | | |
| Theory | : | 100 | 4 |
| Sessional | : | 50 | 2 |
| Total | : | 150 | 6 |
| Duration of Exam | : | 3hrs. | |

**Unit-1 Source Coding**

Introduction to information theory, uncertainty of information, Information measure, entropy, source coding Theorem, Huffman Coding, runlength encoding, rate distortion function, JPEG and MPEG standards in image compression.

**Unit-2 Channel Capacity and Coding**

Channel models, Channel Capacity, Channel Coding, Information Capacity Theorem, The Shannon Limit.

**Unit-3 Error Control Coding**

Linear Block Codes: Introduction, Basic definition, equivalent codes, parity - check matrix, decoding, syndrome decoding, Perfect Codes, Hamming Codes, Optimal Linear codes.

**Unit-4 Cyclic Codes**

Introduction polynomials, The division Algorithm, Method for generating cyclic codes, Burst Error correction, Fire Codes, Golay Codes, CRC Codes, Circuit implementation.

**Unit-5 Bose Chaudhuri Hocquenghem (BCH)**

Introduction, Primitive elements, minimum polynomials, Examples of BCH codes, Decoding of BCH codes, Recd - Solomon codes.

**Unit-6 Convolution Codes**

Introduction, Tree Codes and Trellis Codes, Polynomial description, The Generating function, Matrix Description, Viterbi Decoding, Distance bounds, Turbo Codes, Turbo Decoding.

**Unit-7 Trellis Coded Modulation (TCM)**

Introduction, the concept of coded modulation, Mapping by set Partitioning, Design rules, TCM Decoder.

**Unit-8 Coding for Secure Communication, Cryptography**

Introduction, encryption techniques, Symmetric cryptography, data encryption standard, Asymmetric Algorithm the RSA Algorithm.

**Text books:**

*1. Ranjan Bose,**Information Theory, Coding and Cryptography**, 2nd Edn., Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2008. ISBN-10: 0-07-066901-5, ISBN-13: 978-0-07-066901-7.*

**Reference Books:**

*1. R. Avudaiammal,**Information Coding Techniques**, 2nd Edn., Tat McGraw-Hill Education*

*2. J. G. Proakis, **Digital Communication**, 3rd Edition, McGraw-Hill Publication,.*

MEECE-302 **RESEARCH METHODOLOGY**

| L | T | P | Exam | : | Marks | Credit |
|---|---|---|---|---|---|---|
| 4 | - | - | Theory | : | 100 | 4 |
| | | | Sessional | : | 50 | 2 |
| | | | Total | : | 150 | 6 |
| | | | Duration of Exam : | | 3hrs. | |

**Unit-1**

Research Process and Theoretical Approaches

Nature And Significance of Research Problems – The Literature Review – Data Analyses Strategies – Research Design and Methods

Positivism and Realism – Evolution of scientific inquiry, Induction and Deduction Debate; Verification versus falsification; Paradigms – Nature of Scientific Revolution.

Contemporary Theoretical Trends – Structuration Theory; Feminist Theories, Post-colonial Thinkers; Materialist Feminism and the Politics of Discourse.

**Unit-2**

Introductory Statistical Methods

Statistical Methods is a course in applied statistics that will investigate concepts and methods in descriptive and inferential statistics. F-distribution, confidence intervals, hypotheses testing, and correlation.Survey Research

**Unit-3**

Use of Computer in Research

Introduction to Computer Fundamentals, hardware, Software. Working with MS-Dos, LAN (Novell Netware) environment, Windows Operating System.

DBMS: Data Base Management Systems; Data Base Operations like Creation, Updation, Indexing/Sorting and Searching of Data, Report and Label Generations, Programme Writing. MS-Office: MS Word, Excel, Powerpoint.

Spreadsheet: Introduction to Spread sheet applications, Data Entries, Statistical, Logical and Financial Functions, Graphical Applications and Data Analysis. Advanced Statistical Methods,Qualitative Research

**Unit-4**

Data Analysis with Statistical Packages

Analysis Design: Quantitative data analysis. Research and use of statistical packages for quantitative research data analysis. Introduction to statistical packages in Social Sciences Research. Data preparation using various packages/editors, Data Definition, Transformation and System files generation.

Statistical Analysis: Frequency, Cross tabulation, Descriptive Statistics, T-test, Means, Correlations, Analysis of Variance, Regression, Non-parametric test, Tables and Reports, Factor, Cluster and Discriminant Analysis.

MEECE-205 **Simulation and Modeling**

| L | T | P |
|---|---|---|
| 4 | - | - |

| | | Marks | Credit |
|---|---|---|---|
| Exam | : | | |
| Theory | : | 100 | 4 |
| Sessional | : | 50 | 2 |
| Total | : | 150 | 6 |
| Duration of Exam | : | 3hrs. | |

**Unit-1**

Selected illustrative examples of simulation applications. Models: Structural, Process, Continuous, Discrete, Deterministic, Random, input/output, static, dynamic, multilevel.

**Unit-2**

Simulation: Analog/Digital/Hybrid, verification, validation. Data Modelling and Analysis : Population parameters, hypotheses testing, confidence-intervals, goodness of fit, estimating transient/steady-state characteristics, variance reduction.

**Unit-3**

Simulation Process : Problem formulating, model building, data acquisition, model translation, verification, validation, strategic and tactical planning, experimentation, analysis of results, implementation and documentation. Simulation Languages: Examples from SIMSCRIPT, GPSS, GASP, SIMULA, etc.

**Reference Books**:

1. G.Gordon, System Simulation, 2nd ed., Prentice Hall, 1978.
2. Narsing Deo, System Simulation with Digital Computers, Prentice Hall, 1976.
3. J.R. Leigh, Modelling and Simulation, Peter Peregrims Ltd., 1983.
4. A.M.Law, W.D.Kelton, Simulation Modelling and Analysis, Mcgraw Hill, 1982.

MEECE-206 **ASIC and SoC Design**

| L | T | P |
|---|---|---|
| 4 | - | - |

| Exam | : | Marks | Credit |
|---|---|---|---|
| Theory | : | 100 | 4 |
| Sessional | : | 50 | 2 |
| Total | : | 150 | 6 |
| Duration of Exam | : | 3hrs. | |

**Unit-1**

Introduction: Voice over IP SOC, Intellectual Property, SOC Design Challenges, Design Methodology. Overview of ASICs: Introduction, Methodology and Design Flow, FPGA to ASIC Conversion, Verification.

**Unit-2**

SOC Design and Verification: Introduction, Design for Integration, SOC Verification, Set-Top-Box SOC, Set-Top-Box SOC Example. Summary. References. Physical Design: Introduction, Overview of Physical Design Flow, Some Tips and Guidelines for Physical Design, Modern Physical Design Techniques.

**Unit-3**

Low-Power Design: Introduction, Power Dissipation, Low-Power Design Techniques and Methodologies, Low-Power Design Tools, Tips and Guidelines for Low-Power Design. Low-Power Design Tools: PowerTheater, PowerTheater Analyst, PowerTheater Designer. Open Core Protocol (OCP): Highlights, Capabilities, Advantages, Key Features. Phase-Locked Loops (PLLs): PLL Basics, PLL Ideal Behavior, PLL Errors.

**Text Books:**

1. Farzad Nekoogar and Faranak Nekoogar, From ASICs to SOCs: A Practical Approach, Pearson Education, 2003, ISBN-10: 0-13-033857-5, ISBN-13: 978-0-13-033857-0

**Reference Books:**

1. Michael Smith, Application Specific Integrated Circuit, Addison-Wesley, 1997, ISBN: 0201500221

2. Jari Nurmi, Processor Design: System-On-Chip Computing for ASICs and FPGAs, Springer, 1st edition, 2007, ISBN: 1402055293

3. Douglas J. Smith, HDL Chip Design – a practical guide for designing, synthesizing and simulating ASICs and FPGAs using VHDL or Verilog, Doone Publications, 2000, ISBN: 0965193438

**MTCE 607 INTERNET & WEB TECHNOLOGY**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**UNIT 1 Introduction**
Internet Protocol model, Internet Addresses, IP routing concepts, Table Driven and next hop routing, other routing related protocols, Internet
Access through PPP, SLIP, WWW, Web server, Browsers

**UNIT 2 Router Technology**
Hubs, Bridges, Routers, Routing Protocols, Routing Security, Switch based routing, routing in unicast environment, multicasting, mobile routing

**UNIT 3 Web Server Technologies**
Web's Robot global access to information, HTML, HTTP, Accessing a web server, publishing on web server, secure HTTP, Secure Sockets
Layer, WWW Proxies, IIS, Case study of apache web server.

**UNIT 4 Browsing Systems**
Searching and web casting Technique, Popular web server, basic features, bookmarks, cookies, progress indicators, customization of browsers, browsing tricks, next generation web browsing, search engines, architecture of search engines, search tools, web crawlers, types of crawlers, scalable web crawler, incremental crawler, parallel crawler, focused crawler, agent based crawler, case study of IE.

**UNIT 5 Web site Development**
HTML, XHTML, DHTML, XML, Structuring data, namespaces, XML schema Documents, Document Object Model, DOM methods, simple API for XML, XSL, SOAP,ASP. Net. Security and management issues for creating a web site.

**Reference Books:**
1. Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp- 2001, TMH
2. Internet & World Wide Programming, Deitel, Deitel & Nieto, 2000 Pearson Education
3. Beginning XHTML by Frank Boumpery, Cassandra Greer, Dave Ragett, Jenny Raggett, Sebastian Schnitzenbaumer & ted Wugofski,
2000, WROX press (Indian Shroff Publ. SPD) 1st edition
4. Complete idiots guide to java script, Aron Weiss, QUIE, 1997.
5. Internet & Internet Engg. By Minoli.
6. Internet & Web Technology By Rajkamal.

**MTCST-313 ARTIFICIAL NEURAL NETWORKS**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Introduction:** Inspiration from Neuroscience, History, Issues.

**2. Hopfield model:** Associative memory problem, model, stochastic networks capacity of stochastic n/w.

**3. Optimization problems:** Weighed matching problem, Traveling salesman problem, Graph bipartioning, optimization problems in image processing.

**4. Simple perceptions:** feed forward n/w, Threshold units, linear units, nonlinear units stochastic units, capacity of simple perception.

**5. Multi-layer n/w:**Back propagation, examples and applications performance of multilayer feed forward n/w Kohoanen self organizing n/w cognition & neocognutron.

**6. Recurrent n/w:** Boltzmann n/w, Recurrent Back propagation, Learning time sequence, Reinforcement learning.

**7. Learning:** Supervised, Unsupervised (Hebbian competitive), adaptive resonance theory, Traveling salesman problem.

Applications of artificial Neural Network.

**Text Books:**


1. Introduction to the theory of neural Computation-Hertz Keogh, Palmer
2. Artificial Neural Networks- B. Yegnanarayana (PHI)
3. Genetic Algorithms-David E. Goldberg (Addison Wesley)

**MTCST-305 CELLULAR & MOBILE COMMUNICATION**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Introduction to Cellular Mobile Systems:** A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning of cellular system, overview of generations of cellular systems.

**2. Elements of Cellular Radio Systems Design and interference:** General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems, introduction to co-channel interference, co-channel measurement design of antenna system, antenna parameter and their effects.

**3. Cell Coverage for Signal & antenna structures:** General introduction, obtaining the mobile point to point mode, propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point to point prediction model-characteristics, cell site, antenna heights and signal coverage cells, mobile to mobile propagation, Characteristics of basic antenna structures, antenna at cell site, mobile antennas.

**4. Frequency Management & Channel Assignment**: Hand Off & Dropped Calls, Frequency management, fixed channel assignment, non-fixed channel assignment, traffic & channel assignment. Why hand off, types of hand off and their characteristics, dropped call rates & their evaluation.

**5. Modulation method and coding for error detection and correction:** Introduction to Digital modulation techniques, modulation methods in cellular wireless systems, OFDM. Block coding, convolution coding and Turbo coding.

**6. Multiple access techniques:** FDMA, TDMA, CDMA, Time-division multiple access (TDMA), code division multiple access (CDMA), CDMA capacity, probability of bit error considerations, CDMA compared with TDMA

**7. Spread spectrum Techniques:** Direct sequence spread spectrum, Frequency Hopping Spread spectrum techniques.

**Text Books:**


1. C. Y. Lee and William, "Mobile Cellular Telecommunications", 2nd Ed, McGraw Hill. 2001
2. Mischa Schwartz, "Mobile Wireless Communications", Cambridge Univ. Press, UK, 2005.


**Reference Books:**


1. Mobile Communication Hand Book", 2nd Edition, IEEE Press. 2002
2. Theodore S Rappaport, "Wireless Communication Principles and Practice", 2nd Ed, Pearson Education. 2002
3. Lawrence Harte, "3G Wireless Demystified", McGraw Hill Publications. 2000
4. Kaveh Pahlavan and Prashant Krishnamurthy, "Principles of Wireless Networks", PHI.2000

**MTCST-211 COMPUTER SOFTWARE TESTING**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
**Duration of Exam: 3 Hrs**

**1. Introduction:** What is software testing and why it is so hard?, Error, Fault, Failure, Incident, Test Cases, Testing Process, Limitations of Testing, No absolute proof of correctness, Overview of Graph Theory.

**2. Reporting and analyzing bugs:** Problem reports, Content and Characteristics of Problem Report, analysis and Tactics for analyzing a reproducible bug. Making a bug reproducible.

**3. Problem Tracking System:** Objective of Problem Tracking System, tasks of the system, Problem tracking overview, users of the tracking system, mechanics of the database.

**4. Functional & Structural Testing:** Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.
Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.

**5. Test Case Design:** Characteristics of a good test, equivalence classes and boundary values, visible state transitions, Race conditions and other time dependencies, load testing. Error guessing, Function equivalence testing, Regression Testing, General issues in configuration testing, printer testing
Reducing the number of test cases: Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing, Slice based testing

**6. Testing Activities:** Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, Domain Testing.

**7. Object Oriented Testing:** Issues in Object Oriented Testing, Class Testing, GUI Testing, Object Oriented Integration and System Testing.

**Text Books:**


1 William Perry, “Effective Methods for Software Testing”, John Wiley & Sons, New York, 1995.
2. Cem Kaner, Jack Falk, Nguyen Quoc, “Testing Computer Software”, Second Edition, Van Nostrand Reinhold, New York, 1993.
3. Boris Beizer, “Software Testing Techniques”, Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
4. Louise Tamres, “Software Testing”, Pearson Education Asia, 2002


**Reference Books:**


1. K.K. Aggarwal & Yogesh Singh, “Software Engineering”, New Age International Publishers, New Delhi, 2005
2. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
3. Boris Beizer, “Black-Box Testing – Techniques for Functional Testing of Software and Systems”, John Wiley & Sons Inc., New York, 1995.

**MTCST 302**

**Artificial Intelligence Lab**

| L | T | P |
|---|---|---|
| 0 | 0 | 3 |

Practical based on theory paper Artificial Intelligence Lab.

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**MTCST-104 ADVANCED DATABASE MANAGEMENT SYSTEMS**

L T P
4 0 0

Class Work Marks: 50
Exam Marks: 100
Total Marks: 150
Duration of Exam: 3 Hrs.

**1. Relational Databases:** Integrity Constraints revisited, Extended ER diagram, Relational Algebra, Structure of RDBMS, Normal forms.

**2. Parallel and Distributed Databases:** Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

**3. Objected Oriented and Object Relational Databases:** Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

**4. Multimedia database system:** multimedia database management system, image and text database techniques, Audio and Video Database Techniques Physical Storage and Retrieval. Data structure, Operation, indexing, segmentation.

**5. WEB Database:** Accessing Databases through WEB, WEB Servers, XML Databases, and Commercial Systems.

**6. Data Mining & Data Warehousing:** Knowledge Representation Using Rules, Association and Classification Rules, Sequential Patterns, Algorithms for Rule Discovery, Data Warehousing Architecture, Multidimensional Data Model, Update Propagation OLAP Queries.

**Text Books:**


1. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998
1. Principals of distributed Database system (2nd edition) M. Tamer Ozsu. Patrick valduriez (Pearson)
2. Database system concepts Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006


**Reference Books:**


1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. W. Kim, "Modern Database Systems", 1995, ACM Press, Addision – Wesley,
4. Ullman, J. D., "Principals of database systems", Galgotia publications, 1999.

**MTCST-401** **DISSERTATION**

| L | T/P | C |
|---|---|---|
| | 20 | 20 |

The student will submit a synopsis at the beginning of the semester for the approval from the project committee in a specified format. Synopsis must be submitted within two weeks. The first defense, for the dissertation work, should be held with in two months time. Dissertation Report must be submitted in a specified format to the project committee for evaluation purpose at the end of semester.