

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD**

**M.Tech. (Computer Science & Engineering) I Year
I-Semester**

Scheme of evaluation						
Subject						
Code	Title	L	P	Internal	External	Total
MTCSE 1.1	Design and Analysis of Algorithms	4	-	40	60	100
MTCSE 1.2	Computer Organization	4	-	40	60	100
MTCSE 1.3	Computer Communications	4	-	40	60	100
MTCSE 1.4	Operating Systems	4	-	40	60	100
MTCSE 1.5	Software Engineering	4	-	40	60	100
MTCSE 1.6	Database Management Systems	4	-	40	60	100
Practical MTCSE 1.7	Design and Analysis of Algorithms Lab(Through C++)	-	4	40	60	100

**M.Tech. (Computer Science & Engineering) I Year
II-Semester**

Scheme of evaluation						
Subject						
Code	Title	L	P	Internal	External	Total
MTCSE 2.1	Data Warehousing and Mining	4	-	40	60	100
MTCSE 2.2	Embedded Systems	4	-	40	60	100
MTCSE 2.3	Network Security and Cryptography	4	-	40	60	100
MTCSE 2.4	Object Oriented Analysis and Design	4	-	40	60	100
MTCSE 2.5	Elective - I	4	-	40	60	100
MTCSE 2.6	Elective - II	-	-	40	60	100
Practical MTCSE 2.7	UML Lab	-	4	40	60	100

Elective - I

1. Pattern Recognition and Image Processing
2. Neural Networks
3. Advanced Computer Architecture

Elective – II

1. Middleware Technologies
2. Mobile Computing
3. Software Project Management

M.Tech. (Computer Science & Engineering) II Year

III-Semester

	Internal	External	Total
Project Seminar Satisfactory/Not-Satisfactory	-	-	-

M.Tech. (Computer Science & Engineering) II Year

IV-Semester

	Internal	External	Total
Project Seminar	-	-	-
Dissertation/Thesis Excellent/good/Satisfactory/Not-Satisfactory			

- Note: Eligibility for admission to this course is B.E./B.Tech. in any branch of Engineering.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

I Year M.Tech (CSE)

I Semester

MTCSE 1.1 DESIGN AND ANALYSIS OF ALGORITHMS

UNIT-I

Overview of OOP Principles: Encapsulation, Inheritance, and Polymorphism. **Review of C++-Classes and Objects,** Class members, Access control, class scope, constructors and destructors, dynamic memory allocation and deallocation (new and delete), Polymorphism-Function overloading, operator overloading, generic programming-function and class templates, Inheritance, run time polymorphism using virtual functions, abstract classes, File I/O and Exception handling.

UNIT-II

Algorithm Analysis and Review of Data Structures: Algorithms, Psuedo code for expressing algorithms, **Performance Analysis**-time complexity and space complexity-notation, Omega notation and Theta notation, little o notation, Probabilistic analysis, Amortized analysis, **Review of Data Structures**-The List ADT, Stack ADT, Queue ADT, Implementations using template class, Hash Functions, Collision Resolution in hashing, **Priority queues**-Definition, Priority queues-ADT, **Heaps**-Definition, Insertion and Deletion, **Applications**-Heap sort, **Disjoint sets**-Disjoint set ADT, Union and Find algorithms.

UNIT-III

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's Matrix Multiplication.

UNIT-IV

Greedy method: General method, applications-Job sequencing with dead lines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT-V

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT-VI

Searching and Traversal Techniques: Efficient non-recursive Tree Traversal algorithms, DFS, BFS of Graphs, AND/OR graphs, game trees, Bi-Connected components, **Search Trees**- Balanced search trees- AVL trees, representation, Operations-insertion, deletion and searching, B-Trees-B-Tree of order m, Operations-insertion, deletion and searching.

UNIT-VII

Backtracking and Branch and Bound: General method (Backtracking), **Applications-** n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.
General method (Branch and Bound), **Applications** - Traveling sales person problem, 0/1 knapsack problem-LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT-VIII

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP- Complete classes, Cook's theorem.

Text Books:

1. **Computer Algorithms/C++**, E.Horowitz, S.Sahani and S.Rajasekharan, Galgotia Publishers pvt. Limited.
2. **Data Structures and Algorithm Analysis in C++**, 2nd Edition, Mark Allen Weiss, Pearson Education.
3. **Introduction to Algorithms**, 2nd Edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt.Ltd./ Pearson Education.

Reference Books:

1. **Design and Analysis of algorithms**, Aho, Ullman and Hopcroft, Pearson Education.
2. **Introduction to the Design and Analysis of Algorithms**, A.Levitin, Pearson Education.
3. Data structures, Algorithms and Applications in C++, S.Sahni, University press (India) pvt ltd, 2nd edition, Orient Longman pvt.ltd.
4. **Object Oriented Programming Using C++**, 2nd Edition, I.Pohl, Pearson Education.
5. **Fundamentals of Sequential and Parallel Algorithms**, K.A.Berman, J. L.Paul, Thomson
6. **Data Structures And Algorithms in C++**, 3rd Edition, Adam Drozdek, Thomson.
7. **Algorithm Design: Foundations, Analysis and Internet examples**, M.T.Goodrich and R.Tomassia, John Wiley and sons.

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HYDERABAD**

I Year M.Tech (CSE)

I Semester

MTCSE 1.2 COMPUTER ORGANIZATION

UNIT-I:

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic OPERATIONAL concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation. Fixed Point Representation. Floating – Point Representation. Error Detection codes.

COMPUTER ARITHMETIC: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit
Decimal Arithmetic operations

UNIT-II:

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Microoperations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions – Instruction cycle.

Memory – Reference Instructions. Input – Output and Interrupt. STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

UNIT-III:

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Microprogrammed control

UNIT-IV:

PROGRAM AND NETWORK PROPERTIES

Conditions of Parallelism. Program Partitioning and Scheduling, Program flow Mechanism, System Interconnect Architectures.

SCALABILITY AND PERFORMANCE

Principles of Scalable Performance, Performance Metrics and Measures, Parallel Processing Applications. Speedup Performance Laws. Scalability Analysis and Approaches.

UNIT-V:

THE MEMORY SYSTEM: Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.

UNIT-VI:

INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP) Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, IEEE1394.

UNIT-VII:**PIPELINE AND VECTOR PROCESSING:**

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

UNIT-VIII:

MULTI PROCESSORS: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration. InterProcessor Communication and Synchronization Cache Coherence. Shared Memory Multiprocessors.

MULTIPROCESSING

Multiprocessor System Interconnects. Cache Coherence and Synchronization Mechanisms.

Vector Processing Principles. SIMD Computer Implementation Models.

Latency Hiding Techniques. Principles of Multi Threading.

Data Flow Architecture Evaluation.

TEXT BOOKS:

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI
2. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.

REFERENCE:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals of Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
4. Computer Organization, Anjaneyulu, Himalaya Pub house.

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I Year M.Tech (CSE)

I Semester

MTCSE1.3 COMPUTER COMMUNICATIONS

UNIT-I

Introduction: Uses of computer Networks, Network H/w, Network S/W, Reference Models, Example Networks , Network Standardization.

UNIT-II

Physical Layer: Guided transmission media – Magnetic media, Twisted Pair, coaxial cable, fiber optics .

Data Link Layer: Design Issues, Error detection and correction , Elementary Data Link Protocols, Sliding Window Protocols, Protocol Verification, Example Data Link protocols.

UNIT-III

The Medium Access Sub Layer : The channel allocation problem, Multiple access Protocols, Ethernet , Wireless LANs , Broadband Wireless, Bluetooth ,Data Link Layer Switching.

UNIT-IV

The Network Layer : Network Layer Design Issues, Routing Algorithms ,Congestion Control Algorithms ,Quality Of Service, Internet Working ,Network Layer in Internet.

UNIT-V

The Transport Protocol: The Transport Service, Elements of transport protocol , A simple Transport Protocol , Internet Transport Protocols UDP, Internet Transport Protocols TCP, Performance Issues.

UNIT-VI

The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia,

UNIT-VII

Network Security: Cryptography , Symmetric _key Algorithms, Public–Key Algorithms, Digital Signatures, Management of public keys.

UNIT-VIII

Communication Security, Authentications Protocols, E-mail Security, Web security, Social Issues.

TEXT BOOKS:

1. Computer Networks -- Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

REFERENCE BOOKS:

1. Computer Communications and Networking Technologies –Michael A.Gallo, William M.Hancock - Thomson Publication
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

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I Semester

MTCSE 1.4 OPERATING SYSTEMS

UNIT I:

Operating System Introduction, Structures - Simple Batch, Multi programmed, time-shared, Personal Computer, Parallel, Distributed Systems ,Real-Time Systems , System components, Operating-System services, System Calls, Virtual Machines, System Design and Implementation.

UNIT II:

Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling.

UNIT III

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging , Performance of Demanding Paging , Page Replacement ,Page Replacement Algorithm, Allocation of Frames, Thrashing.

UNIT IV:

File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

Deadlocks - System Model, Dead locks Characterization, Methods for Handling Dead locks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

UNIT V:

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

UNIT VI:

Introduction to Distributed systems : Goals of distributed system, hardware and software concepts, design issues.

Communication in Distributed systems : Layered protocols, ATM networks , the Client - Server model, remote procedure call and group communication.

UNIT VII:

Synchronization in Distributed systems : Clock synchronization, Mutual exclusion, E-tech algorithms, the Bully algorithm, a ring algorithm, atomic transactions

UNIT VIII:

Deadlocks: deadlock in distributed systems, Distributed deadlock prevention, and distributed dead lock detection.

TEXT BOOKS:

- 1 Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
- 2 Distributed Operating System - Andrew. S. Tanenbaum, PHI

REFERENCE BOOKS:

1. Operating System A Design Approach-Crowley,TMH.
2. Operating Systems – Internals and Design Principles Stallings, Fifth Edition– 2005,
3. Pearson Education/PHI
4. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI
5. Operating Systems, Dhamdhare, TMH

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I Semester

MTCSE 1.5 SOFTWARE ENGINEERING

UNIT-I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

UNIT-II:

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

UNIT-III:

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT-IV:

Design Engineering: Design process and Design quality, Design concepts, the design model.

Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design.

UNIT-V:

Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

UNIT-VI:

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

UNIT-VII:

Plans for testing: Snooping for information, Coping with complexity through teaming, Testing plan focus areas , Testing for recoverability , Planning for troubles.

UNIT-VIII:

Preparing for the tests: Software Reuse, Developing good test programs , Data corruption, Tools, Test Execution ,Testing with a virtual computer, Simulation and Prototypes, Managing the Test, Customer's role in testing

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering- Sommerville , 7th edition, Pearson education.
3. Software Testing Techniques – Loveland, Miller, Prewitt, Shannon, Shroff Publishers & Distribution Pvt Ltd.,

REFERENCE BOOKS:

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

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I Semester

MTCSE 1.6 DATABASE MANAGEMENT SYSTEMS

UNIT – I:

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor – History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

UNIT – II:

Relational Model: Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra and Calculus: Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT – III:

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOTR – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT – IV:

Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – forth Normal Form.

UNIT – V:

Overview of Transaction Management: ACID Properties – Transactions and Schedules – Concurrent Execution of transaction – Lock Based Concurrency Control – Performance Locking – Transaction Support in SQL – Introduction to Crash recovery.

UNIT – VI:

Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions – Dealing with Dead Locks – Specialized Locking Techniques – Concurrency without Locking.

Crash recovery: Introduction to ARIES – the Log – Other Recovery related Structures – the Write-Ahead Log Protocol – Check pointing – recovering from a System Crash – Media recovery – Other approaches and Interaction with Concurrency control.

UNIT – VII:

Overview of Storage and Indexing: Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning.

UNIT – VIII:

Storing data: Disks and Files: - The Memory Hierarchy – Redundant Arrays of Independent – Disks – Disk Space Management – Buffer Manager – Files of records – Page Formats – record formats.

Tree Structured Indexing: Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Hash Based Indexing: Static Hashing – Extendable hashing – Linear Hashing – Exendble vs. Liner hashing.

TEXT BOOKS:

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, IV edition.

REFERENCE BOOK:

1. Introduction to Database Systems, C.J.Date Pearson Education
2. Data base Systems design, Implementation, and Management, Rob & Coronel 5th Edition.Thomson
3. Data base Management System, Elmasri Navrate Pearson Education
4. Data base Management System Mathew Leon, Leon Vikas.

5. Data base Systems, Connoley Pearson education

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I Year M.Tech (CSE)

II Semester

MTCSE 2.1 DATA WAREHOUSING AND MINING

UNIT-I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining,

UNIT-II

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Online Data Storage.

UNIT-III

Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems,

UNIT-IV

Concepts Description: Characterization and Comparison: Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

UNIT-V

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT-VI

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by

Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT-VII

Cluster Analysis Introduction :Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

UNIT-VIII

Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
2. Data Mining Techniques – ARUN K PUJARI, University Press
3. Building the DataWarehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd..

REFERENCE BOOKS:

1. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
2. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION
3. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION
4. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION

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I Year M.Tech (CSE)

II Semester

MTCSE 2.2 EMBEDDED SYSTEMS

Unit I

Embedded Computing: Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples. (Chapter I from Text Book 1, Wolf)

Unit II

The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts. (Chapter 3 from Text Book 2, Ayala)

Unit III

Basic Assembly Language Programming Concepts : The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. (Chapters 4,5 and 6 from Text Book 2, Ayala)

Unit IV

Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts. (Chapter 7 and 8 from Text Book 2, Ayala)

Unit-V

Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication. (Chapter 10 and 11 from Text Book 2, Ayala)

Unit VI

Introduction to Real – Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment **(Chapter 6 and 7 from Text Book 3, Simon)**

Unit VII

Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System. **(Chapter 8,9,10 and 11 from Text Book 3, Simon)**

Unit VIII

Introduction to advanced architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I²C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.
(Chapter 8 from Text Book 1, Wolf)

Text Books:

1. Computers and Components, Wayne Wolf, Elseveir.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
3. An Embedded Software Primer, David E. Simon, Pearson Education.

Reference Books:

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.

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II Semester

MTCSE 2.3 NETWORK SECURITY AND CRYPTOGRAPHY

UNIT-I

Introduction:

Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security.

Classical Techniques:

Conventional Encryption model, Steganography, Classical Encryption Techniques.

UNIT-II

Modern Techniques:

Symplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

Algorithms:

Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block cifers.

UNIT-III

Conventional Encryption:

Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

Public Key Cryptography:

Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptograpy.

UNIT-IV

Number theory:

Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

Message authentication and Hash functions:

Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

UNIT-V

Hash and Mac Algorithms:

MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC.

Digital signatures and Authentication protocols:

Digital signatures, Authentication Protocols, Digital signature standards.

UNIT-VI

Authentication Applications:

Kerberos, X.509 directory Authentication service.

Electronic Mail Security:

Pretty Good Privacy, S/MIME.

UNIT-VII**IP Security:**

Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management.

Web Security:

Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.

UNIT-VIII**Intruders, Viruses and Worms:**

Intruders, Viruses and Related threats.

Fire Walls:

Fire wall Design Principles, Trusted systems.

Text Books:

1. Cryptography and Network Security: Principles and Practice - William Stallings, Pearson Education.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

Reference Books:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Principles of Information Security, Whitman, Thomson.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.

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I Year M.Tech (CSE)

II Semester

MTCSE 2.4 OBJECT ORIENTED ANALYSIS AND DESIGN

UNIT-I:

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT-II:

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.

Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT-III

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT- IV:

Basic Behavioral Modeling-I: Interactions, Interaction diagrams.

UNIT-V:

Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT-VI:

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT-VII:

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT-VIII:

Case Study: The Unified Library application

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

REFERENCE BOOKS:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Mark Priestley: Practical Object-Oriented Design with UML, TATA McGrawHill
5. Applying UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.

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II Semester

MTCSE 2.5.1 PATTERN RECOGNITION AND IMAGE PROCESSING (ELECTIVE I)

UNIT-I

Introduction: Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation (Text book-1, p.nos: 1-17).

Bayesian Decision Theory : Introduction, continuous features – two categories classifications, minimum error-rate classification- zero–one loss function, classifiers, discriminant functions, and decision surfaces (Text book-1, p.nos: 20-27, 29-31).

UNIT-II

Normal density: Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context (Text book-1, p.nos: 31-45,51-54,62-63).

UNIT-III

Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case (Text book-1, p.nos: 84-97).

UNIT-IV

Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Data description and clustering – similarity measures, criteria function for clustering (Text book-1, p.nos: 517 – 526, 537 – 546).

UNIT-V

Pattern recognition using discrete hidden Markov models:

Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs

UNIT-VI

Continuous hidden Markov models :

Continuous observation densities, multiple mixtures per state, speech recognition applications.

UNIT-VII

Digital image fundamentals :

Introduction, an image model, sampling and quantization, basic relationships between pixels, image geometry

Image enhancement:

Back ground, enhancement by point processing histogram processing, spatial filtering, introduction to image transforms, image enhancement in frequency domain.

UNIT VIII

Image Segmentation and Edge Detection: Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,

Text Books:

1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
1. Fundamentals of speech Recognition, Lawrence Rabiner, Biing – Hwang Juang Pearson education.
2. R.C Gonzalez and R.E. Woods, “Digital Image Processing”, Addison Wesley, 1992.

Reference Books:

1. A.K.Jain, “Fundamentals of Digital Image Processing”, Prentice Hall of India.
2. Digital Image Processing – M. Anji Reddy, BS Publications.
3. Pattern Recognition and Image Analysis – Earl Gose, Richard John baugh, Steve Jost PHI 2004

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

I Year M.Tech (CSE)

II Semester

MTCSE 2.5.2 NEURAL NETWORKS (ELECTIVE I)

UNIT I

INTRODUCTION - what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks (p. no's 1 –49)

UNIT II

LEARNING PROCESS – Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process, (p. no's 50 –116)

UNIT III

SINGLE LAYER PERCEPTRONS – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perceptron –convergence theorem, Relation between perceptron and Bayes classifier for a Gaussian Environment (p. no's 117 –155)

UNIT IV

MULTILAYER PERCEPTRON – Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection, (p. no's 156 –201)

UNIT V

BACK PROPAGATION - back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of

back propagation learning, Accelerated convergence, supervised learning. (p. no's 202 – 234)

UNIT VI

SELF ORGANIZATION MAPS – Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive pattern classification (p. no's 443 –469, 9.1 –9.8)

UNIT VII

NEURO DYNAMICS – Dynamical systems, stability of equilibrium states, attractors, neurodynamical models , manipulation of attractors as a recurrent network paradigm (p. no's 664 –680, 14.1 –14.6)

UNIT VIII

HOPFIELD MODELS – Hopfield models, computer experiment I (p. no's 680-701, 14.7 –14.8)

TEXT BOOKS:

1. Neural networks A comprehensive foundations, Simon Haykin, Pearson Education 2nd edition 2004

REFERENCE BOOKS

1. Artificial neural networks - B.Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural networks in Computer intelligence, Li Min Fu TMH 2003
3. Neural networks James A Freeman David M S kapura pearson education 2004

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II Semester

MTCSE 2.5.3 ADVANCED COMPUTER ARCHITECTURE (ELECTIVE I)

UNIT-I

Fundamentals of Computer design- Technology trends- cost- measuring and reporting performance quantitative principles of computer design.

UNIT-II

Instruction set principles and examples- classifying instruction set- memory addressing- type and size of operands- addressing modes for signal processing-operations in the instruction set- instructions for control flow- encoding an instruction set.-the role of compiler

UNIT- III:

Instruction level parallelism (ILP)- over coming data hazards- reducing branch costs – high performance instruction delivery- hardware based speculation- limitation of ILP

UNIT-IV

ILP software approach- compiler techniques- static branch protection- VLIW approach- H.W support for more ILP at compile time- H.W verses S.W solutions

UNIT- V

Memory hierarchy design- cache performance- reducing cache misses penalty and miss rate – virtual memory- protection and examples of VM.

UNIT-VI

Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading.

UNIT-VII

Storage systems- Types – Buses - RAID- errors and failures- bench marking a storage device- designing a I/O system.

UNIT-VIII

Inter connection networks and clusters- interconnection network media – practical issues in interconnecting networks- examples – clusters- designing a cluster

Text Book:

1. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier)

Reference:

1. “Computer Architecture and parallel Processing” Kai Hwang and A.Briggs International Edition McGraw-Hill.
2. Advanced Computer Architectures, Dezso Sima, Terence Fountain, Peter Kacsuk, Pearson.

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I Year M.Tech (CSE)

II Semester

MTCSE 2.6.1 MIDDLEWARE TECHNOLOGIES (ELECTIVE – II)

UNIT-I:

Introduction to client server computing: Evolution of corporate computing models from centralized to distributed computing, client server models. Benefits of client server computing, pitfalls of client server programming.

UNIT-II:

CORBA with Java: Review of Java concept like RMI, RMI API, JDBC. Client/Server CORBA-style, The object web: CORBA with Java.

UNIT III:

Introducing C# and the .NET Platform; Understanding .NET Assemblies; Object – Oriented Programming with C#; Callback Interfaces, Delegates, and Events.

UNIT IV:

Building c# applications: Type Reflection, Late Binding, and Attribute-Based Programming; Object Serialization and the .NET Remoting Layer; Data Access with ADO.NET; XML Web Services.

UNIT-V:

Core CORBA / Java: Two types of Client/ Server invocations-static, dynamic. The static CORBA, first CORBA program, ORBlets with Applets, Dynamic CORBA-The portable count, the dynamic count multi count.

UNIT-VI:

Existential CORBA: CORBA initialization protocol, CORBa activation services, CORBAIDL mapping CORBA java- to- IDL mapping, The introspective CORBA/Java object.

UNIT-VII:

Java Bean Component Model: Events, properties, persistency, Introspection of beans, CORBA Beans

UNIT-VIII:

EJBs and CORBA: Object transaction monitors CORBA OTM's, EJB and CORBA OTM's, EJB container frame work, Session and Entity Beans, The EJB client/server development Process The EJB container protocol, support for transaction EJB packaging EJB design Guidelines.

Text Books:

- 1 Client/Server programming with Java and CORBA Robert Orfali and Dan Harkey, John Wiley & Sons ,SPD 2nd Edition
- 2 Java programming with CORBA 3rd Edition, G.Brose, A Vogel and K.Duddy, Wiley-dreamtech, India John wiley and sons
- 3 C# and the .NET Platform Andrew Troelsen, Apress Wiley-dreamtech, India Pvt Ltd

Reference: Books:

1. Distributed Computing, Principles and applications, M.L.Liu, Pearson Education
2. Client/Server Survival Guide 3rd edition Robert Orfali Dan Harkey and Jeri Edwards, John Wiley & Sons
3. Client/Server Computing D T Dewire, TMH.
4. IBM Webspere Starter Kit Ron Ben Natan Ori Sasson, TMh, New Delhi
5. Programming C#, Jesse Liberty, SPD-O'Reilly.
6. C# Preciesely Peter Sestoft and Henrik I. Hansen, Prentice Hall of India
7. Intoduction to C# Using .NET Pearson Education
8. C# How to program, Pearson Education

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I Year M.Tech (CSE)

II Semester

MTCSE 2.6.2 MOBILE COMPUTING (ELECTIVE – II)

UNIT- I

Introduction to Mobile Communications and Computing:

Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture

GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

UNIT- II

(Wireless) Medium Access Control: Motivation for a specialized

MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT- III

Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

UNIT- IV

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT- V

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT- VI

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

UNIT- VII

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

UNIT- VIII

Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

Text Books:

- 1). **Jochen Schiller**, “Mobile Communications”, *Addison-Wesley*. (Chapters 4, 7, 9, 10, 11), second edition, 2004.
- 2) **Stojmenovic and Cacute**, “Handbook of Wireless Networks and Mobile Computing”, *Wiley*, 2002, **ISBN** 0471419028. (Chapters 11, 15, 17, 26 and 27)

Reference Books:

- 1) Reza Behravanfar, “Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML”, ISBN: 0521817331, Cambridge University Press, October 2004,
- 2) Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, “Fundamentals of Mobile and Pervasive Computing”, ISBN: 0071412379, McGraw-Hill Professional, 2005.
- 3) Hansmann, Merk, Nicklous, Stober, “Principles of Mobile Computing”, *Springer*, second edition, 2003.
- 4) Martyn Mallick, “Mobile and Wireless Design Essentials”, *Wiley DreamTech*, 2003

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HYDERABAD**

I Year M.Tech (CSE)

II Semester

MTCSE 2.6.3 SOFTWARE PROJECT MANAGEMENT (ELECTIVE II)

UNIT - I

Conventional Software Management : The waterfall model, conventional software Management performance. Evolution of Software Economics : Software Economics, pragmatic software cost estimation.

UNIT - II

Improving Software Economics : Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT – III

The old way and the new : The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process. Life cycle phases : Engineering and production stages, inception, Elaboration, construction, transition phases.

UNIT-IV

Artifacts of the process : The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures : A Management perspective and technical perspective.

UNIT – V

Flows of the process : Software process workflows, Inter trans workflows. Checkpoints of the Process : Major Mile Stones, Minor Milestones, Periodic status assessments. Interactive Process Planning : Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.

UNIT – VI

Project Organizations and Responsibilities : Line-of-Business Organizations, Project Organizations, evolution of Organizations.
Process Automation : Automation Building Blocks, The Project Environment.

UNIT-VII

Project Control and Process instrumentation : The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process : Process dicriminants, Example.

UNIT – VIII

Future Software Project Management : Modern Project Profiles Next generation
Software economics, modern Process transitions.

Case Study : The Command Center Processing and Display System-
Replacement(CCPDS-R)

Text Book :

1. Walker Rayce : Software Project Management, Pearson Education, 2005.

Reference Books :

1. Richard H.Thayer : Software Engineering Project Management, IEEE Computer Society, 1997.
2. Shere K.D. : Software Engineering and Management, Prentice Hall, 1988.