

**M. TECH
COMPUTER SCIENCE & TECHNOLOGY
1st SEMESTER**

Ref: No LII(2)Syllabi/2003 dated 17-06-2003

With effect from 2003-04 admitted batch

Syllabi

**Chairman
Board of Studies**

**Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
Visakhapatnam**

M. TECH (COMPUTER SCIENCE & TECHNOLOGY)
1ST SEMESTER
Course Structure and Scheme of Examination

Code	NAME OF THE SUBJECT	Periods/ week		EVALUATION Max Marks		
		T	P	Internal	External	Total
MTCST1.1	Theory of Computation	3	-	50	100	150
MTCST1.2	Object Oriented Analysis & Design	3	-	50	100	150
MTCST1.3	Data Structures and Algorithms	3	-	50	100	150
MTCST1.4	Computer Organization	3	-	50	100	150
MTCST1.5	Database Management Systems	3	-	50	100	150
MTCST1.6	Systems Programming	3	-	50	100	150
MTCST1.7	Object Oriented Analysis & Design Lab	-	3	50	100	150
MTCST1.8	Computer Organization Lab	-	3	50	100	150

Except MTCST 1.6, other subjects are common with M.Tech (IT)

MTCST 1.1

THEORY OF COMPUTATION

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

1. INTRODUCTION TO FINITE AUTOMATA: 6 Periods

Alphabets and languages- Finite Representation of Languages. Deterministic Finite Automata – Non- deterministic Finite Automata – Equivalence of Deterministic and Non-Finite Automata – Properties of the Languages Accepted by Finite Automata – Finite Automata and Regular Expressions – Proofs those Languages Are and Are Not Regular.

2. CONTEXT FREE LANGUAGES: 9 Periods

Context –Free Grammar – Regular Languages and Context-Free Grammar – Pushdown Automata – Pushdown Automata and Context-Free Grammar – Properties of Context-Free Languages – Closure Properties – Periodicity Properties – Determinism and Parsing – Deterministic Pushdown Automata and Context – Free Languages – Top- down Parsing – Bottom – Up parsing.

3. TURING MACHINES: 5 Periods

The Definition of Turing Machine – Computing with Turing Machines – Combining Turing Machines – some Examples of More Powerful Turing Machines .

4. CHURCH' THESIS: 6 Periods

Church's Thesis – The Primitive Recursive functions – Godelization – The μ -Recursive Functions – Turing – Computability of the μ -Recursive functions – Universal Turing Machines.

5. UNCOMPUTABILITY: 6 Periods

The Halting Problem – Turing-Enumerability, Turing – Acceptability, and Turing - Decidability – Unsolved problems about Turing machines and μ -Recursive Functions- Post's correspondence problem.

6. COMPUTATIONAL COMPLEXITY: 6 Periods

Time-bounded Turing Machines – Rate of Growth of functions – Time-Bounded simulations – The Classes P and NP – NP-Completeness – Some NP-complete Problems – Integer Programming – The Traveling Salesman Problem.

7. THE PREPOSITIONAL CALCULUS 5 Perods

Introduction – Syntax of the Prepositional Calculus – Truth-Assignments – Validity and Satisfiability – Equivalence and Normal Forms – resolution in Prepositional Calculus.

8 THE PREDICATE CALCULUS:

5 Periods

Syntax of the Predicate Calculus – Structures and Satisfiability – Equivalence – Unsolvability and NP-Completeness- Resolution in the Predicate Calculus.

TEXT BOOK: Harry R Lewis, CHRISTOS H. PAPADIMITRIOU, : ELEMETS OF THE THEORY OF COMPUTATION”, Prentice-Hall of India Private Limited, New

REFERENCE: HOPCROFT. J.E and J.D.ULLMAN. Introduction to Automata Theory, Languages, and Computation, Addison-Wesley, Reading, Mass. 1979.

MTCST 1.2 OBJECT-ORIENTED ANALYSIS AND DESIGN

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

1.Introduction: 7 Periods
Overview of object-oriented systems development object basics
object-oriented system development life cycle

2. UML: 10 Periods
Object-oriented methodologies.
Unified modeling language

3. Analysis: 13Periods
Object-oriented analysis process: Identifying use cases.
Object analysis: classification
Identifying object relationships, attributes and methods

4. Design: 13 Periods
Object-oriented Design Process and Design Axioms Designing classes
Access Layer: Object storage and object interoperability.
View Layer: Designing interface objects.

5. QA: 5Periods
Soft ware Quality Assurance

Text Book:

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.

MTCST 13 DATA STRUCTURES AND ALGORITHMS

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

1. INTRODUCTION: 4 Periods.
Overview of C++ classes, pointers, parameters passing, templates, using Matrices.
2. ALGORITHM ANALYSIS: 3 Periods
Basics of time complexity estimates, General norms for running time calculation
3. LISTS, STACKS & QUEUES: 10 Periods
Abstract Data Types, Representation & implementation of ADT list, Doubly linked list, Circular linked lists, Representation, Implementation and applications of ADT stack and Queue.
4. TREES: 10 Periods
Implementation and traversal of trees, Binary Trees and Binary search trees in C++, Concepts of AVL Trees, Splay Trees and B-Trees.
5. HASHING: 4 Periods.
Hash Function, Separate chains, Open addressing, rehashing, Extendible Hashing.
6. INTERNAL SORTING ALGORITHMS: 7 Periods.
Sorting like insertion Sort, shell Sort, Heap Sort, Merge Sort, Quick Sort and Simple external Sorting algorithm.
7. GRAPH ALGORITHMS: 10 Periods.
Representation of graph Topological Sort, shortest-path Algorithm, Network flow problem, Minimum spanning tree algorithm, Applications of Depth – First search. Introduction to NP-Completeness.

TEXT BOOK:

Data Structures & Algorithm Analysis in C++ , Mark Allen Weiss. Second edition, Pearson Edition. Asia.

REFERENCE BOOKS:

1. Data Structures & Algorithm in C++, Adam Drozdek. Vikas publication House.
2. Data Structure, Algorithm and OOP, Gregory L. Heileman (Tata Mc Graw Hill Edition)

MTCST 1.4 COMPUTER ORGANISATION

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

1. Digital Logic Circuits and Components: 6 Periods
Digital Computers - Logic gates - Boolean Algebra - Map Simplifications
Combinational Circuits: Half-Adder, Full-Adder, decoders, Encoders, Multiplexers
Sequential Circuits: Flip flops, Registers, Shift Registers, Binary Counters - Memory Unit.

2. Data Representation : 4 Periods
Data Types - Complements - Fixed Point Representation - Floating Point Representation - Other
Binary Codes - Error detection Codes

3. Processor Organisation : 8 Periods
General Register Organisation - ALU - Instruction codes - Instruction Formats - Stack
Organisation - Addressing modes

4. Control Unit : 8 Periods
Register transfer and micro operations, Timing and Control, Control Memory, micro
programming, Hard wired control

5. 8085 Microprocessor : 6 Periods
Internal Architecture, Instruction Set, Assembly Language programming

6. Input/Output Organisation : 8 Periods
I/O interface, Asynchronous data transfer, Modes of transfer, priority Interrupt, Direct memory
access.

7. Memory Organisation 8 Periods
Memory Hierarchy, Main memory, Auxiliary memory, Associate Memory, Cache Memory, and
Virtual memory.

Text Book:

- 1). Computer System Architecture , M. Morris Mano, Prentice Hall of India Pvt. Ltd., Eastern Economy Edition, Third Edition, Sept. 2002
- 2). Micro processor Architecture, Programming & Applications with the 8085, Ramesh S Goankar, Penram International Publishing(India) Pvt. Ltd., Fourth Edition, 2002

Reference Book :

Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd., Eastern Economy Edition, Sixth Edition, 2003

MTCST 1.5 DATABASE MANAGEMENT SYSTEMS

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

1. Introduction: 6 Periods

Data, storing data in dbms, relational model, levels of abstraction, data independence, queries in dbms, transaction management, structure of dbms and people who work with dbms

2. ER Model, Relational Model and Relational algebra: 12 Periods

ER model, entities, attributes & entity sets; relationship & relationship sets, ER diagrams, key and participation constraints, weak entities, class hierarchies, aggregation, conceptual design with ER model, case study: requirement analysis and conceptual design, Relational algebra, relational calculus

3. SQL: 6 Periods

Basic SQL query, nested queries, aggregate operators, null values, integrity constraints, Triggers

4. Database Design: 12 Periods

Schema refinement, Functional dependencies, closure of set of FDs and attribute, Third & Boyce-code normal forms, properties of decomposition, Decomposition into 3NF and BCNF, Schema refinement in database design

5. Transaction Processing: 12 Periods

ACID properties, Transaction & schedule, Concurrent execution of transaction, Lock-based concurrency control, crash recovery, Serializability and recoverability, Lock management, lock conversions, dealing with dead locks, Optimistic concurrency control, timestamp-based concurrency, multiversion concurrency control, ARIES, logs, the write-ahead log protocol, checkpointing, recovering from a system crash, media recovery

Text Book

Database Management Systems; Raghu Ramakrishnan, Johannes Gehrke
4th Edition, McGraw-Hill

Reference:

Database System Concepts; A. Silberschatz, H. Korth
5th Edition, McGraw-Hill

MTCST 1.6

SYSTEMS PROGRAMMING

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

1. Introduction to Systems Programming: 8 Periods
Introduction to Assembly Language Programming - Introduction to Instruction Formats, Data formats - Role of Base Register, Index Register.
2. Introduction to Assembler 12 Periods
Databases used in assembler design, Design of Assembler - Single Pass & Double Pass.
3. Introduction to Macros 11 Periods
Various types of Macros, Design of Macro Processor - Single Pass & Double Pass.
4. Introduction to Loaders: 11 Periods
Types of Loaders, databases used in Loaders, Design of Loaders - Absolute & DLL.
5. Introduction to Software Tools 6 Periods
Text editors, Interpreters, Program Generators, Debug Monitors.

TextBook:
Systems Programming, Donovan, Tata Mc Graw Hill

Reference:
System Programming, Dhamdhere (IInd Revised Edition), Tata Mc Graw Hill

MTCST 1.7 OBJECT ORIENTED ANALYSIS & DESIGN LAB

Practical: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

The student is expected to take up about five mini-projects and model them and produce Use Cases, Analysis Documents - both static & dynamic aspects, Sequence Diagrams and State-Charts, Database Design using Rational Products A sample collection of ideas is given. Numerous other ideas can be found in the pages from the list of references given below.

Mini-Project - I: A Point-of-Sale (POS) System

A POS system is a computerized application used to record sales and handle payments; it is typically used in a retail store, it includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services are temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client-side terminals and interfaces such as browser, PDAs, touch-screens.

Mini-Project - II: Online Bookshop Example

Following the model of amazon.com or bn.com, design and implement an online bookstore.

Mini-Project - III: A Simulated Company

Simulate a small manufacturing company. The resulting application will enable the user to take out a loan, purchase a machine, and over a series of monthly production runs, follow the performance of their company.

Mini-Project - IV: A Multi-Threaded Airport Simulation

Simulate the operations in an airport. Your application should support multiple aircrafts using several runways and gates avoiding collisions/conflicts.

Landing: an aircraft uses the runway, lands, and then taxis over to the terminal. Take-Off: an aircraft taxis to the runway and then takes off

Mini-Project - V: An Automated Community Portal

Business in the 21st Century is above all BUSY. Distractions are everywhere. The current crop of "enterprise intranet portals" are often high noise and low value, despite the large capital expenditures it takes to stand them up. Email takes up 30 - 70% of an employee's time. Chat and Instant Messaging are either in the enterprise or just around the corner. Meanwhile, management is tasked with unforeseen and unfunded leadership and change-agent roles as well as leadership development and succession management. What is needed is a simplified, repeatable process that enhances communications within an enterprise, while allowing management and peers to self-select future leaders and easily recognize high performance team members in a dynamic way.

Additionally, the system should function as a general-purpose content management, business intelligence and peer-review application.

Glasscode's goal is to build that system. The software is released under a proprietary license, and will have the following features: Remote, unattended moderation of discussions However, it will have powerful discovery and business intelligence features, and be infinitely extendable, owing to a powerful API and adherence to Java platform standards. Encourages peer review and indicates for management potential leaders, strong team players and reinforces enterprise and team goals seamlessly and with zero administration.

Mini-Project -VI: A Content Management System

The goal is to enable non-technical end users to easily publish, access, and share information over the web, while giving administrators and managers complete control over the presentation, style, security, and permissions.

Features:

- ? Robust Permissions System
- ? Templates for easy custom site designs
- ? Total control over the content
- ? Search engine friendly URL's
- ? Role based publishing system
- ? Versioning control
- ? Visitor profiling

Mini-Project-VII: An Auction Application

Several commerce models exist and are the basis for a number of companies like eBay.com, priceline.com etc. Design and implement an auction application that provides auctioning services. It should clearly model the various auctioneers, the bidding process, auctioning etc.

Mini-Project -VIII: A Notes and File Management System

In the course of one's student years and professional career one produces a lot of personal notes and documents. All these documents are usually kept on papers or individual files on the computer. Either way the bulk of the information is often erased corrupted and eventually lost. The goal of this project is to build a distributed software application that addresses this problem. The system will provide an interface to create, organize and manage personal notes through the Internet for multiple users. The system will also allow users to collaborate by assigning permissions for multiple users to view and edit notes.

Mini-Project - IX: A Customizable Program Editor

A programmer's editor which will be focused on an individual programmer's particular needs and style. The editor will act according to the specific language the current source file is in, and will perform numerous features, such as auto-completion or file summarization, on the file. These features will be able to be turned on or off by the programmer, and the programming style of the user will be used to create as efficient an editing environment as possible.

Mini-Project - X: A Graphics Editor

Design and implement a Java class collection that supports the construction of graph editing applications, i.e., applications that include the ability to draw structured and unstructured diagrams. E.g.,

The goal of the GEF project is to build a graph editing library that can be used to construct many, high-quality graph editing applications. Some of GEF's features are:

A simple, concrete design that makes the framework easy to understand and extend.

Node-Port-Edge graph model that is powerful enough for the vast majority of connected graph applications.

Model-View-Controller design based on the Swing Java UI library makes GEF able to act as a UI to existing data structures, and also minimizing learning time for developers familiar with Swing.

High-quality user interactions for moving, resizing, reshaping, etc. GEF also supports several novel interactions such as the broom alignment tool and section-action-buttons. Generic properties sheet based on JavaBeans introspection. XML-based file formats based on the PGML standard

Text Book(s):

"Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process", Craig Larman, Pearson Education Asia, 2002, 2nd Edition

Reference(s):

"Object Oriented Systems Analysis and Design using UML", Simon Sennet, Steve McRobb, and Ray Farmer, McGraw Hill, 2002, 2nd Edition

"Object-Oriented Analysis & Design," Andrew Haigh, Tata McGraw-Hill, 2001,

Various Net Resources and projects:

<http://user-mode-linux.sourceforge.net/case-studies.html>

<http://www.onesmartclick.com/programming/case-studies.html>

<http://www.tigris.org/sarvlets/ProjectList?type=P> rejects

<http://hotscripts.com/>

<http://www.developingwebs.net/>

<http://sourceforge.net/projects/>

<http://governing.com/gpp/gponline.htm>

<http://www.cio.com/research/government/gov.html>

<http://www.whitehouse.gov/omb/inforeg/egovstrategy.pdf>

<http://www.andhrapradesh.com/>

<http://www.ap-lt.com/>

<http://www.aponline.gov.in>

MTCST 1.8

COMPUTER ORGANISATION LAB

Practical: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

List Of Experiments:

TTL Characteristics

TTL IC Gates

Flip-Flops

Counters

Shift Registers

Multiplexers

Decoders

Binary Adders: Half Adder, Full Adder

8085 Assembly Language Programming Using MPS-85 KIT

P.C. Architecture Familiarization

Note:

1 Week for Lab. Instruction, 1 Week for Repeat Expts, 8 Week for expts. 1 to 8
4 Weeks for expt. 9, 2 Weeks for expt. 10

**M. TECH
COMPUTER SCIENCE & TECHNOLOGY
2nd SEMESTER**

Approved letter no LII(2)/Syllabi/2003 dated 29-11-03

With effect from 2003-04 admitted batch

Syllabi

**Chairman
Board of Studies**

**Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
Visakhapatnam**

M. TECH IN COMPUTER SCIENCE & TECHNOLOGY
Course Structure and Scheme of Examination
With effect from 2003-04 admitted batch

II SEMESTER

Code	Title	Theory	Lab	Ext Exam	Int Assess	Total
MTCST2.1	Compiler Design	3	-	100	50	150
MTCST2.2	Operating Systems	3	-	100	50	150
MTCST2.3	Embedded Systems	3	-	100	50	150
MTCST2.4	Computer Networks	3	-	100	50	150
MTCST2.5	Artificial Intelligence	3	-	100	50	150
MTCST2.6	Networks Lab	-	3	100	50	150
MTCST2.7	DBMS Lab	-	3	100	50	150

Except MTCST 2.1, other subjects are common with M.Tech (IT)

MTCST 2.1

COMPILER DESIGN

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

INTRODUCTION:

Compiler & translators, Structure of compiler, Lexical Analyzer, Syntax analyzer, Intermediate code generator. Optimization, code generation, Error handling, compiler writing tools, structures of high-level language, The Syntactic specification of programming Languages.

LEXICAL ANALYSIS:

Lexical Analyzer, approaches to design of Lexical Analyzer, regular expression, finite automata, language for specifying Lexical Analyzer, Implementation of a Lexical Analyzer.

PARSING TECHNIQUES: 1

Parsers, Shift reduce parsing, operator – precedence parsing, Top-Down parsing, predicative parsing.

PARSING TECHNIQUES2:-

LR parsers
Constanction of SLR Parser
Constanction of CLR Parser
Constanction of LALR Parser

SYNTAX DIRECTED TRANSLATION:

Syntax- directed translator schemes and implementation, intermediate code, postfix notation, three address coding, quadruple & triple, translation of assignment statements, Boolean expression, Conditional statements, Postfix translations, array reference, Procedure calls, case statements, record structures.

CODE OPTIMIZATION:-

Sources of Optimization, Loop Optimization, DAG representation.
Global Data Flow Analysis.

CODE GENERATION:

Problems in code generation. Simple code generator, code generator from DAG's, Peephole optimization.

Brief description of Symbol tables, Error detection and recovery, Runtime storage administration.

TEXT BOOK:

1. Principles of compiler design by Alfred V.Aho, D. Ullman (chapters: 1,2,3,4,5,6,7,9,10,11,12,15).

REFERECE BOOKS:

1. Compiler Design, Trembly and Sorauson, Tata Mcgraw Hill.
2. Systems programming by John. J. Donovan(chapter 8)
3. Theory of Computer science by K.L.P. Mishra & N.Chandra Sekhran (chapter 2,3,4)
4. Compiler Design in C – Allen I. Holub, PHI.

MTCST 2.2

OPERATING SYSTEMS

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

Overview

Introduction, Computer System structures, Operating systems structures 5%

Process Management

Processes, Threads, CPU scheduling, Process synchronization , Deadlocks 40%

Storage Management

Memory management, Virtual memory, file system, I/O systems, Mass – storage structure 35%

Protection and Security

Protection and Security 10%

Case study

Overview groups of UNIX,LINUX, Windows NT Operating systems 10%

Text Book:

Applied Operating System Concepts – Avi Silberschatz, Peter Galvin, Grey Gagne

MTCST 2.3

EMBEDDED SYSTEMS

Instruction: 3 Periods/week
Internal Assessment : 50 Marks

External Assessment : 100 Marks
Time : 3 Hours

1. Introduction to Embedded Systems: Embedded Systems overview, Examples of Embedded Systems, Microprocessors and Microcontrollers, The 8051 Architecture
2. 8051 Assembly Language Programming
3. Interrupts
4. Embedded Software Architectures
5. Introduction to Real-Time Operating Systems
6. Operating System Services
7. Basic Design Using a Real-Time Operating System
8. Embedded Software Development Tools & Debugging techniques

TEXT BOOKS:

1. The 8051 Microcontroller, Architecture, Programming, & Applications,
Kenneth J. Ayala, Penram International Publishing(India), Second Edition 1996
2. An Embedded Software Primer
David E. Simon, Pearson Education, Indian Reprint 2001

REFERENCE BOOK

1. Fundamentals of Embedded Software: Where C and Assembly Meet
Daniel W. Lewis, Pearson Education, Indian Reprint 2002

MTCST 2.4

COMPUTER NETWORKS

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

Switching:

Circuit switching; Packet switching; Message switching

Point-to-point protocol:

Transition states; PPP layers; Link control protocol; Authentication; Network control protocol

ISDN:

Services; History; Subscriber access; ISDN layers

X.25

X.25 layers; Other protocols related to X.25

Frame relay:

Introduction; Frame relay operation; Frame relay layers; Congestion control; Leaky bucket algorithm; Traffic control

Networking and Internetworking Devices:

Repeaters; Bridges; Routers; Gateways; multi-protocol routers; Brouters; Switches; Routing switches: Distance vector and link state routing

TCP/IP –I

Overview of TCP/IP; Network layer; Addressing; Subnet; Other Protocol in the network layer (ARP, RARP, ICMP, IGMP); Transport layer

TCP/IP-II

Client-server model; BOOTP; DHCP; DNS; LETNET; FTP;TFTP;SMTP;SNMP; HTTP And WWW

VLAN And VPNs:

VLAN; VPN;

Network Security:

Security Aspects; Privacy; Digital Signatures; PGP; Access authentication

Text Book: Data Communications and Networking

Edition: Second update

Author: Behrouz A Forouzan

Publishers: Tata McGraw-Hill Co Ltd

ISBN: 0-07-049935-7

MTCST 2.5

ARTIFICIAL INTELLIGENCE

Instruction: 3 Periods/week

External Assessment: 100marks

Internal Assessment: 50 Marks

Time: 3 Hours

Introduction to AI

Roots and Scope of AI, Definition, Turing Test, Application Areas of AI

AI as Representation and Search

Predicate Calculus

Structures and Strategies for State Space Search

Heuristic Search

Control and Implementation of State Space Search

Representation and Inference

Knowledge Representation

Strong Methods for Problem Solving

Reasoning in Uncertain Situations

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

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 Book:

“Artificial Intelligence – Structures and Strategies for Complex Problem Solving”, George F. Luger, 4th Edition, Pearson Education , 2003.

Reference Books:

“Artificial Intelligence”, Knight, Tata McGraw Hill

“Artificial Intelligence ‘a Modern Approach’ Russell & Norvig, second edition , Pearson Education , 2003.

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 50marks
Time: 3 Hours

1. Identifying well known ports on a Remote System :

By trying to listen to the various well known ports by opening client connections. If the exception does not occur then the remote port is active else the remote port is inactive.

2. Writing a Chat application :

i). One-One: By opening socket connection and displaying what is written by one party to the other.

ii). Many-Many (Broad cast): Each client opens a socket connection to the chat server and writes to the socket. Whatever is written by one party can be seen by all other parties.

3. Data retrieval from a Remote database:

At the remote database a server listens for client connections. This server accepts SQL queries from the client, executes it on the database and sends the response to the client.

4. Mail Client:

i). POP Client : Gives the server name , user name and password retrieve the mails and allow manipulation of mail box using POP commands.

ii). SMTP Client : Gives the server name, send e-mail to the recipient using SMTP commands- (Core Java 2 pg:163.)

5. Simulation of Telnet:

Provide a user interface to contact well-known ports, so that client-server interaction can be seen by the user.

6. Simple file transfer between two systems (without protocols):

By opening socket connection to our server on one system and sending a file from one system to another.

7. TFTP- Client:

To develop a TFTP client for file transfer. (Unix Network programming- Stevens.)

8. HTTP-Server:

Develop a HTTP server to implement the following commands.

GET, POST, HEAD, DELETE.

The server must handle multiple clients.

Reference Books : 1. Java Network Programming,

Harold

Orielly

2. An Introduction to Computer Networking,

Kenneth C. Mansfield Jr and James L. Antonakos

Pearson Education Asia

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 50marks
Time: 3 Hours

Each student is assigned with a problem. The student is to develop a logical and physical database design for the problem.

A. The logical design performs the following tasks:

1. Map the ER/EER diagrams to a relational schema. Be sure to underline all primary keys, include all necessary foreign keys and indicate referential integrity constraints.
2. Identify the functional dependencies in each relation
3. Normalize to the highest normal form possible

B. Perform physical design based above logical design using Oracle/MSSQL on Windows platform and MySQL/PostgreSQL on Linux platform

C: Perform DML and DDL using all possible SQL commands and with the help any one host languages like C, C++, VB etc (ie embedded SQL)

D. Perform DML and DLL using PL/SQL and PL/pgSQL for the above problems

Ref: 1. Oracle PL/SQL Programming

Steven Feuerstein

O'Reilly Publishers

2. PL/pgSql, search internet for necessary documentation

**M. TECH
COMPUTER SCIENCE & TECHNOLOGY
3rd SEMESTER**

**Ref: LII(2)M.Tech/CSE&IT/Syllabus&MQP/2004, Dt 24-04-04
With effect from 2003-04 admitted batch**

Syllabi

**Chairman
Board of Studies**

**Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
Visakhapatnam**

M. TECH IN COMPUTER SCIENCE & TECHNOLOGY

Course Structure and Scheme of Examination

With effect from 2003-04 admitted batch

III SEMESTER

Code	Title	Theory	Lab	Ext Exam	Int Assess	Total
MTCST3.1	Seminar on Advanced topics	3	-	-	100	100
MTCST3.2	Elective-1	3	-	100	50	150
MTCST3.3	Elective-II	3	-	100	50	150
MTCST3.4	Embedded Systems Lab	3	-	100	50	150
MTCST3.5	Web Programming Lab	3	-	100	50	150

Except Cryptography and Network Security, other subjects are common with M.Tech (IT)

Elective-1

- a) Data warehousing & Data Mining
- b) Image Processing
- c) Bioinformatics
- d) Cryptography and Network Security

Elective-II

- a) Object Oriented Software Engineering
- b) Geo Information Systems
- c) Design analysis and algorithms
- d) Advanced Microprocessors

Seminar: 4 Periods/week

Internal Assessment: 100marks

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 50 pages

MTCST 3.2

DATA WAREHOUSING AND MINING

(Elective-I)

Instruction: 3 Periods/week

External Assessment: 100marks

Internal Assessment: 50 Marks

Time: 3 Hours

Introduction to Data Warehouse.

Data Warehouse Architecture: System Processes, Process Architecture, Hardware Architecture.

Data Warehouse Design: Data Warehouse Schema, Partitioning strategy , Aggregations, Data Marting, Meta data, System & Process managers.

Introduction to Data Mining and related topics.

Data Mining Techniques:- Statistics, Similarity Measures, Decision Trees, Neural Networks, Genetic Algorithms.

Algorithms for Classification:- Statistical-based, Distance-based, Decision Tree- based, NN – based and Rule based.

Algorithms for Clustering:- Hierarchical Algorithms, Partitional Algorithms, Clustering large Databases, Clustering with categorical Attributes.

Associate Rules:- Basic Algorithms, Parallel and Distributed algorithms, Comparative study, Incremental Rules, Advanced Association Rule Technique, Metrics for Quality of a Rule.

Web Mining:- Web Content mining, Structure Mining, Usage Mining

Text Books:

1. Data Warehousing in the real world by Sam Anahory & Murray, Pearson Education publishers.
2. Data Mining – Introductory & Advanced topics by Margaret H. Dunham,. Pearson Education publishers.

Reference Books:

1. Data Mining – Concepts and Techniques by Han and Kamber,2001, Morgan Kaufmann Publishers
2. Oracle 8i – Data Warehousing by Cohen, Abbey, Taub, Tata McGraw Hill
3. Business Intelligence and Data Warehousing, by IBM, PHI

MTCST 3.2

IMAGE PROCESSING

(Elective-I)

Instruction: 3 Periods/week

External Assessment: 100marks

Internal Assessment: 50 Marks

Time: 3 Hours

1. Fundamentals of Image Processing

Image Acquisition, Image Model, Sampling, Quantization, Relationship between pixels, distance measures, connectivity, Image Geometry, Photographic film.

Histogram: Definition, decision of contrast basing on histogram, operations basing on histograms like image stretching, image sliding, Image classification.

Definition and Algorithm of Histogram equalization.

2. Image Transforms:-

A detail discussion on Fourier Transform, DFT,FFT, properties

A brief discussion on WALSH Transform, WFT, HADAMARD Transform, DCT.

3. Image Enhancement: (by SPATIAL Domain Methods)

a Arithmetic and logical operations, pixel or point operations, size operations,

b. Smoothing filters-Mean, Median, Mode filters – Comparative study

c.. Edge enhancement filters – Directorial filters, Sobel, Laplacian, Robert, KIRSCH

Homogeneity & DIFF Filters, prewitt filter, Contrast Based edge enhancement techniques.

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Comparative study

d. Low Pass filters, High Pass filters, sharpening filters. – Comparative Study

e. Comparative study of all filters

f. Color image processing.

4. Image enhancement : (By FREQUENCY Domain Methods)

Design of Low pass, High pass, EDGE Enhancement, smoothening filters in Frequency Domain. Butter worth filter, Homomorphic filters in Frequency Domain

Advantages of filters in frequency domain, comparative study of filters in frequency domain and spatial domain.

5. Image compression: Definition, A brief discussion on – Run length encoding, contour coding, Huffman code, compression due to change in domain, compression due to quantization
Compression at the time of image transmission. Brief discussion on:- Image Compression standards.

6. Image Segmentation: Definition, characteristics of segmentation.

Detection of Discontinuities, Thresholding Pixel based segmentation method.

Region based segmentation methods – segmentation by pixel aggregation, segmentation by sub region aggregation, histogram based segmentation, spilt and merge technique. Use of motion in segmentation (spatial domain technique only)

7. Morphology:-

Dilation, Erosion, Opening, closing, Hit-and-Miss transform, Boundary extraction, Region filling, connected components, thinning, Thickening, skeletons , Pruning
Extensions to Gray – Scale Images
Application of Morphology in I.P

Text Book:

Digital Image Processing , by Rafael C. Gonzalez and Richard E. Woods
Addison Wesley

Reference books:

1. Fundamentals of Electronic Image Processing by Arthyr –R – Weeks, Jr. (PHI)
2. Image processing, Analysis, and Machine vision by Milan Sonka vaclan Halavac
Roger Boyle, Vikas Publishing House.

MTCST 3.2

BIOINFORMATICS

(Elective-I)

Instruction: 3 Periods/week

External Assessment: 100marks

Internal Assessment: 50 Marks

Time: 3 Hours

1. Introduction:
Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition and prediction, Folding problem, Sequence Analysis, Homology and Analogy.
2. Protein Information Resources
Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases.
3. Genome Information Resources
DNA sequence databases, specialized genomic resources
4. DNA Sequence analysis
Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases
5. Pair wise alignment techniques
Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.
6. Multiple sequence alignment
Definition and Goal, The consensus, computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching
7. Secondary database searching
Importance and need of secondary database searches, secondary database structure and building a sequence search protocol
8. Analysis packages
Analysis package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.

Text Books:

1. Introduction to Bioinformatics, by T K Attwood & D J Parry-Smith
Addison Wesley Longman
2. Bioinformatics- A Beginner's Guide by Jean-Michel Claverie, Cedric Notredame, WILEY
dreamlech India Pvt. Ltd

Reference Books:

1. Introduction to Bioinformatics by M.Lesk
OXFORD publishers (Indian Edition)

MTCST 3.2 CRYPTOGRAPHY AND NETWORK SECURITY

(Elective-I)

Instruction: 3 Lec/week

Univ.-Exam : 3 Hours

Sessional Marks: 50

Univ-Exam-Marks:100

Introduction :

Confidentiality -- Data Integrity -- Authentication -- Non-Repudiation. -- Overview of Issues involved.

Classical Encryption Techniques:

Monoalphabetic, Substitution Methods, Polyalphabetic Substitution Methods -- Permutation Methods -- Cryptanalysis of these Methods.

Modern Encryption Techniques:

Simplified DES -- DES -- Triple DES -- Block Cipher , Design Principles -- Block Cipher Modes of Operation. IDEA -- Security Issues Involved with these methods.

Confidentiality Using Conventional Encryption :

Placement of Encryption -- Traffic Confidentiality -- Key Distribution -- Random Number , Generation.

Introduction to Number Theory:

(Basics Pertaining to Security Related Algorithms). Public Key Cryptography : Principles -- RSA Algorithm.

Message Authentication and Hash Functions -- Hash and MAC Algorithms.

Digital Signatures and Authentication Protocols -- Authentication Applications

Basic Overview of :

Electronic Mail Security -- IP Security -- WEB Security

System Security :

Intruders, Viruses and Worms -- Firewalls

Text Book:

Cryptography and Network Security, William Stallings. (Second Edition)
Pearson Education Asia .

Reference:

1. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes-Ousley, Keith Strassberg Tata Mcgraw-Hill

2. Handbook of Applied Cryptography

MTCST 3.3 OBJECT ORIENTED SOFTWARE ENGINEERING

(Elective-II)

Instruction: 3 Lec/week
Univ.-Exam : 3 Hours

Sessional Marks: 50
Univ-Exam-Marks:100

1. Software & Software Engineering
The nature of software, software engineering and as branch of engineering profession, stakeholders in software engineering, software quality, software engineering projects,
2. Developing requirements
Domain analysis, software project's starting point, problem definition and scope, What is requirement?, type of requirements, gathering and analyzing of requirements, requirements document types, reviewing, managing change in requirements,
3. Modeling with classes
UML, essentials of UML class diagrams, associations and multiplicity, generalization, instance diagrams,
4. Using design patterns
Pattern introduction, the abstraction-occurrence pattern, general hierarchical pattern, the play-role pattern, the singleton pattern, the observer pattern, the delegation pattern, the adaptor pattern, the façade pattern, the immutable pattern, the read-only interface pattern and the proxy pattern.
5. Focusing on users and their tasks
User-centred design, characteristics of users, developing use case models of systems, the basics of user interface design, usability principles, evaluation users interfaces
6. Modeling interactions and behavior
Interaction diagrams, state diagrams, activity diagrams
7. Architect ring and designing software
The process of design, principles leading to good design, techniques for making good design decisions, software architecture, writing a good design document
8. Testing and inspecting to ensure high quality
Basic definitions of defect, error and failure, effective and efficient testing, defects in ordinary and numerical algorithms, defects in timing and coordination, defects in handling stress and unusual situations, documentation defects, writing formal test cases and test plans, strategies for testing large software, inspections, quality assurance in general
9. Managing the software process
Project management, software process model, cost estimation, building software engineering teams, project scheduling and tracking, contents of a project plan

Text Book: Object-Oriented Software Engineering Practical software development using UML and Java by Timothy C. Lethbridge & Robert Langaniere McGraw-Hill Co

MTCST 3.3 GEOGRAPHICAL INFORMATION SYSTEMS

(Elective-II)

Instruction: 3 Lec/week

Univ.-Exam : 3 Hours

Sessional Marks: 50

Univ-Exam-Marks:100

Introduction:

Definition of GIS and Related Terminology-Evolution of GIS-Components of GIS-Approaches to study of GIS

Maps and GIS:

Introduction-Map Scale- Classes of maps-The mapping Process-Plane coordinate systems and Transformations- Geographic Coordinate System of Earth- Map Projection- Establishing a spatial framework for mapping Locations on Earth- Georeferencing-Acquisition of Spatial Data for the terrain- Topographic Mapping-Attribute Data for Thematic Mapping

Digital Representation of Geographic Data:

Introduction-Technical Issues Pertaining to Digital Representation of Geographic Data-Database creation and management-Raster Geographic and Vector data representation-Object oriented Geographic Data representation-Relationship between Data representation and Data Analysis in GIS

Data Quality and Data Standards:

Introduction-Concepts and Definitions of Data Quality-Components of Geographic Data Quality-Assessment of Data Quality- Managing Spatial Data Errors-Geographic Data Standards-Geographic Data Standards And GIS Development

Raster and Vector-Based GIS Data Processing:

Introduction-Acquiring and Handling Raster Data Processing Cartographic Modeling-Characteristics of Vector- Based GIS Data Processing Vector Data Input Functions Nontopological GIS Analysis Functions Feature-Based Topological Functions Layer-Based Topological Functions Vector-Based Output Functions Application Programming

Visualization of Geographic Information and Generation:

Introduction-Cartography in the Context of GIS-Human-Computer Interaction and GIS-Visualization of Geographic Information Principles of Cartographic Design in GIS-Generation of Information Products

Remote Sensing and GIS Integration:

Introduction-Principles of Electromagnetic Remote Sensing System Classifications-Imaging Characteristics of Remote Sensing Systems-Extraction of Metric Information from Remotely Sensed Images-Extraction of Thematic Information from Remotely Sensed Images- Integration of Remote Sensing and GIS

Digital Terrain Modeling:

Introduction-Definitions and Terminology Approaches to Digital Terrain-Data Sampling-Acquisition of Digital Terrain Data-Data Processing, Analysis, and Visualization-Applications of Digital Terrain Models.

Spatial Analysis and Modeling:

Introduction-Descriptive Statistics-Spatial Auto Correlation- Quadrat Counts and Nearest-Neighbor Analysis-Trend Surface Analysis-Gravity Models-Network Analysis-GIS Modeling

GIS Implementation and Project Management:

Introduction-Software Engineering as Applied to GIS-GIS Project Planning-Systems Analysis and User Requirements-Geographic Database Design Methodology-GIS Application Software Design Methodology-Systems Implementation and Technology Rollout-Systems Maintenance and Technical Support

GIS Issues and Prospects:

Introduction-Issues of Implementing GIS-The Trend of GIS-Development Frontiers of GIS Research.

Text Book:

Concepts and Techniques of Geographic Information Systems, by C. P. Lo & Albert K. W. Yeung, Prentice Hall of India Ltd

Reference Books:

- 1) An Introduction to Geographical Information Systems, by Ian Heywood, Sarah Cornelium & Steve Carver, Pearson Education
- 2) Introduction to Geographic Information Systems, by Kang-rsung Chang, Tata McGraw Hill Publishing Company Limited

MTCST 3.3 DESIGN AND ANALYSIS OF ALGORITHMS

(Elective-II)

Instruction: 3 Periods/week

External Assessment: 100marks

Internal Assessment: 50 Marks

Time: 3 Hours

Introduction:

Analyzing algorithms-Designing algorithms-Asymptotic notation-Standard notations and common functions-The substitution method-The recursion tree method-The master method

Sorting and Order statistics:

Heaps-maintaining the heap property-building a heap-The heapsort algorithm-description of quick sort-performance of quicksort-A randomized version of quicksort-Analysis of quicksort-Lower bounds for sorting-Counting sort-Radix sort-Bucket sort-Minimum and Maximum-Selection in expected and worst case linear times

Dynamic Programming:

Assembly-line scheduling-Matrix chain multiplication-elements of dynamic programming-longest common subsequence-Optimal binary search trees

Greedy algorithms:

An activity selection problem-Elements of greedy strategy-Huffman codes

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-Flow networks- The Ford-Fulkerson method-Maximum bipartite matching

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

Chapters: 2, 3, 4, 6, 7, 8, 9, 15, 16 (except 16.4 and 16.5), 22, 23, 24, 25, 26 (except 26.4 and 26.5) 34, 35 of text book

Text Book:

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 Wiley and sons
3. Fundamentals of sequential and parallel algorithms, by Kenneth A. Berman & Jerome L. Paul, Vikas Publishing House
- 4.

MTCST 3.3

ADVANCED MICROPROCESSORS

(Elective-II)

Instruction: 3 Periods/week

External Assessment: 100marks

Internal Assessment: 50 Marks

Time: 3 Hours

General Structure Of Microprocessor

Microprocessor Architecture:

Introduction; Instruction Set; Data Formats; Instruction Formats; Addressing Modes

Pipelining:

The Instruction Pipeline; Pipeline Hazards; Instruction Level Parallelism

Risc Principles

The Intel X86 Family:

Introduction; The Register Set; Data Formats; Addressing Modes; Instruction Set and Assembly Directives; Interrupt; Segmentation; Paging; Real and Virtual mode Execution; Protection Mechanism; Task Management

The Pentium

Advanced Risc Microprocessors:

The IBM RS/6000, The Super SPARC, MIPS Architecture, i860 Architecture,

Textbook:

Advanced Microprocessors, by Daniel Tabak, 2nd Edition, McGraw-Hill, 1995

Referencw Books:

Intel Manuals for Intel X86 Family and i860 Family

MTCST 3.4

EMBEDDED SYSTEMS LAB

Instruction: 3 Periods/week
Internal Assessment: 50 Marks

External Assessment: 100marks
Time: 3 Hours

I - Cycle

8051 Assembly Language and C-Programming and DSP programming with 8051 based Embedded system + PC, and DSP- μ P based Embedded System + PC

1. 8051 Assembly Language Programming Exercises using 8051 Trainer and Pentium Class PC or VT 100/220 Terminal
2. 8051 Assembly Language Programming Exercises using 8051 Trainer, ICE-51 Module, and Pentium Class PC
3. 8051 C- programming Exercises with CYGNAL kit C8051F124DK Development Kit or equivalent , Keil C51 C –Compiler, and Pentium Class PC
4. 8051 C- programming Exercises with SPJ Systems Board - SBC 51 Single Board Computer Development System or equivalent, IDE 51 C- Compiler, and Pentium Class PC
5. DSP Programming using ADSP 2181 trainer, IDE Visual DSP ++ 3.0 C-Compiler, and Pentium Class PC
6. DSP Programming using ADSP 2181 trainer, IDE Visual DSP ++ 3.0 C-Compiler, EZICE Module and Pentium Class PC
7. DSP Programming using TMS 320C6x Development System, IDE Code Composer Studio- C Compiler, and Pentium Class PC

II CYCLE

I/O interface and I/O Programming with 8051-based System + Pentium Class PC

1. Interfacing Toggle Switch and LED Display
2. Interfacing 8 x 3 Push Button Keyboard
3. Interfacing ASCII Key Board
4. Interfacing Hex Key Board and Hex Display
5. Interfacing Multiplexed Hex Display
6. Interfacing a D.M. Printer
7. Interfacing Traffic Light Control Board

MTCST 3.5

WEB PROGRAMMING LAB

Instruction: 3 Periods/week

External Assessment: 100marks

Internal Assessment: 50 Marks

Time: 3 Hours

1. Design of the Web pages using various features of HTML and DHTML
2. Client server programming using servlets, ASP and JSP on the server side and java script on the client side
3. Web enabling of databases
4. Multimedia effects on web pages design using Flash.

Reference Books:

1. Internet and Web Technologies by Raj Kamal, Tata McGraw-Hill
2. Programming the World Wide Web by Robert W. Sebesta, Pearson Education

**M. TECH
COMPUTER SCIENCE & TECHNOLOGY
4th SEMESTER**

Ref: LII(2)M.Tech/CSE&IT/Syllabus&MQP/2004, Dt 24-04-04

With effect from 2003-04 admitted batch

**Chairman
Board of Studies**

**Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
Visakhapatnam**

M. TECH IN COMPUTER SCIENCE & TECHNOLOGY

Course Structure and Scheme of Examination

With effect from 2003-04 admitted batch

IV SEMESTER

Code	Title	Ext Asses	Total
MTCST	Project	100	100