

**M. TECH  
INFORMATION 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)**  
**1<sup>ST</sup> SEMESTER**  
**Course Structure and Scheme of Examination**

Code	NAME OF THE SUBJECT	Periods/ week		EVALUATION Max Marks		
		T	P	Internal	External	Total
MTIT1.1	Theory of Computation	3	-	50	100	150
MTIT1.2	Object Oriented Analysis & Design	3	-	50	100	150
MTIT1.3	Data Structures and Algorithms	3	-	50	100	150
MTIT1.4	Computer Organization	3	-	50	100	150
MTIT1.5	Database Management Systems	3	-	50	100	150
MTIT1.6	Network Security & Cryptography	3	-	50	100	150
MTIT1.7	Object Oriented Analysis & Design Lab	-	3	50	100	150
MTIT1.8	Computer Organization Lab	-	3	50	100	150

**Except MTIT 1.6, other subjects are common with M.Tech (CST)**

## MTIT 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  $\mu$ -Recursive Functions – Turing – Computability of the  $\mu$ -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  $\mu$ -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.

## MTIT 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: 13 Periods  
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: 5 Periods  
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.



## MTIT 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



## **MTIT 1.6 NETWORK SECURITY AND CRYPTOGRAPHY**

**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

## MTIT 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, 2<sup>nd</sup> Edition

Reference(s):

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

## **MTIT 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  
INFORMATION TECHNOLOGY  
II SEMESTER**

**With effect from 2003-04 admitted batch**

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

**Syllabi**

**Chairman  
Board of Studies**

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

# **M. TECH INFORMATION 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
MTIT2.1	E Commerce	3	-	100	50	150
MTIT2.2	Operating Systems	3	-	100	50	150
MTIT2.3	Embedded Systems	3	-	100	50	150
MTIT2.4	Computer Networks	3	-	100	50	150
MTIT2.5	Artificial Intelligence	3	-	100	50	150
MTIT2.6	Networks Lab	-	3	100	50	150
MTIT2.7	DBMS Lab	-	3	100	50	150

Except MTIT 2.1, other subjects are common with M.Tech (CST)

**MTIT 2.1**

**E-COMMERCE**

**Instruction: 3 Periods/week**  
**Internal Assessment: 50 Marks**

**External Assessment: 100marks**  
**Time: 3 Hours**

Foundations of Electronic Commerce, Retailing in Electronic Commerce, Retailing in Electronic Commerce, Internet Consumers and Market Research, Advertisement in Electronic Commerce, Electronic Commerce for Service Industries, Business-Business Electronic Commerce, Internet and Extranet, Electronic Payment Systems, EC Strategy and Implementation, Public Policy: From Legal Issues to Privacy, Infrastructure for EC, Economics, Global and Other Issues in EC, Software Agents

Text Book:

Electronic Commerce - A Managerial Perspective by Efraim Turban, Jae Lee, David King & H.Michael Chung, Pearson Education Asia (Low Price Edition)

## MTIT 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

## **MTIT 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

## MTIT 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, 4<sup>th</sup> 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

## MTCST 2.7

## DBMS LAB

**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 INFORMATION 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
MTIT3.1	Seminar on Advanced topics	3	-	-	100	100
MTIT3.2	Elective-1	3	-	100	50	150
MTIT3.3	Elective-II	3	-	100	50	150
MTIT3.4	Embedded Systems Lab	3	-	100	50	150
MTIT3.5	Web Programming Lab	3	-	100	50	150

**Except Knowledge Management, other subjects are common with M.Tech (CST)**

Elective-1

- a) Data warehousing & Data Mining
- b) Image Processing
- c) Bioinformatics
- d) Knowledge Management

Elective-II

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

### MTIT 3.1

## SEMINAR ON ADVANCED TOPICS

**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

**MTIT 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

**MTIT 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.

–

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.

## MTIT 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)

## **MTIT 3.2                    KNOWLEDGE MANAGEMENT**

(Elective-I)

**Instruction:                    3 Periods/week**

**External Assessment: 100marks**

**Internal Assessment: 50 Marks**

**Time: 3 Hours**

1. Introduction  
Introduction to Knowledge Management, The Knowledge Edge,  
The Origins of Knowledge
2. Implementing Knowledge Management  
The 10-Step Knowledge Management Road Map
3. The First Phase: Infrastructure Evaluation And Leverage  
The Leveraged Infrastructure, Aligning Knowledge Management and  
Business Strategy
4. The Second Phase: KM System Analysis, Design and Development  
The Knowledge Management Platform, Knowledge Audit and Analysis,  
esigning the KM Team, Creating the KM System Blueprint, Developing the  
KM System
5. The Third Phase:  
KMS Development, Prototyping and Development, Leadership and Reward  
Structures
6. The Final Phase and Beyond: Measuring Real-Option Analysis for  
Performance  
Real-Options Analysis for Knowledge Valuation

Text Books:

1. The Knowledge Management Toolkit by AMRIT TIWANA  
Pearson Education, Second Edition
2. Knowledge Management, Elias M.Awad, Hassan M. Ghaziri  
Pearson Education

## **MTIT 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

## **MTIT 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

## **MTIT 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.

**MTIT 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, 2<sup>nd</sup> Edition, McGraw-Hill, 1995

Referencw Books:

Intel Manuals for Intel X86 Family and i860 Family

**MTIT 3.4**

**EMBEDDED SYSTEMS LAB**

(Elective-II)

**Instruction: 3 Periods/week**

**External Assessment: 100marks**

**Internal Assessment: 50 Marks**

**Time: 3 Hours**

**I - Cycle**

8051 Assembly Language and C-Programming and DSP programming with 8051 based Embedded system + PC, and DSP- $\mu$ 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

**MTIT 3.5**

**WEB PROGRAMMING LAB**

(Elective-II)

**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  
INFORMATION 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 INFORMATION TECHNOLOGY**

## **Course Structure and Scheme of Examination**

**With effect from 2003-04 admitted batch**

### **IV SEMESTER**

Code	Title	Ext Assess	Total
MTIT	Project	100	100