ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

M.Tech.
Information Technology

(Effective for the students admitted from the Academic Year 2007-08)

Jawaharlal Nehru Technological University
Hyderabad – 500 085

Course Structure

M.Tech. (Information Technology) I Year
I-Semester

Code	Subject	L	P
MTI 1.1	Data Warehousing & Mining	4	-
MTI 1.2	Middle Ware Technologies	4	-
MTI 1.3	Network Programming	4	-
MTI 1.4	Software Project Management	4	-
MTI 1.5	Elective - I	4	-
Practicals MTI 1.6	Middle Ware Technologies Lab and Data Warehousing & Mining Lab	-	4
MTI 1.7	Network Programming Lab	-	4

M.Tech. (Information Technology) I Year
II-Semester

Code	Subject	L	P
MTI 2.1	Internetworking with TCP/IP	4	-
MTI 2.2	Network Management Systems	4	-
MTI 2.3	Information Retrieval Systems	4	-
MTI 2.4	Design Patterns	4	-
MTI 2.5	Elective - II	4	-
Practicals MTI 2.6	Internetworking with TCP/IP Lab	-	4
MTI 2.7	Design Patterns Lab	-	4

Elective - I
1. Web Technologies
2. Advanced Computer Architecture
3. Network Security & Cryptography

Elective – II
1. Human Computer Interaction
2. Software Testing Methodologies
3. Mobile Computing
4. Embedded Systems

M.Tech. (Information Technology) II Year III-& IV-Semester

Seminar Project

Excellent/good/Satisfactory/Not-Satisfactory

I Year M.Tech (IT) **I Semester**

MTI 1.1 DATA WAREHOUSING AND MINING

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

UNIT-VI

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT-VII

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

UNIT-VIII

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I Year M.Tech (IT) I Semester

MTI 1.2 MIDDLE WARE TECHNOLOGIES

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

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

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

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

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

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

UNIT-VII:
Java Bean Component Model: Events, properties, persistency, Intrespection of beans, CORBA Beans

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

Text Books:

1 Client/Server programming with Java and CORBA Robert Orfali and Dan Harkey, John Wiley & Sons ,SPD 2nd Edition

2 Java programming with CORBA 3rd Edition, G.Brose, A Vogel and K.Duddy, Wiley-dreamtech, India John wiley and sons

3 C# and the .NET Platform Andrew Troelsen, Apress Wiley-dreamtech, India Pvt Ltd

Reference: Books:

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

I Year M.Tech (IT) **I Semester**

MTI 1.3 NETWORK PROGRAMMING

UNIT-I
Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT-II
Sockets : Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers.
Close function and related function.

UNIT-III
TCP client server : Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

UNIT-IV
I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

UNIT-V
Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

UNIT-VI
Elementary name and Address conversions: DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

UNIT-VII
IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores.

UNIT-VIII
Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

Text Book:
1. UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.
2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.

I Year M.Tech (IT) **I Semester**

MTI 1.4 SOFTWARE PROJECT MANAGEMENT

UNIT - I

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

UNIT - II

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

UNIT – III

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

UNIT-IV

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

UNIT – V

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

UNIT – VI

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

UNIT-VII

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

UNIT – VIII

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

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

Text Book :

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

Reference Books:

1. Richard H.Thayer : Software Engineering Project Management, IEEE Computer Society, 1997.

2. Shere K.D. : Software Engineering and Management, Prentice Hall, 1988.

I Year M.Tech (IT) **I Semester**

MTI 1.5.1 WEB TECHNOLOGIES (ELECTIVE-I)

UNIT-I:
HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

UNIT-II:
Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script

UNIT-III:
XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

UNIT-IV:
Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's

UNIT-V:
Web Servers: Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues,

UNIT-VI:
Introduction to JSP: The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

UNIT-VII:
JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

UNIT VIII:
Database Access : Database Programming using JDBC, Studying Javax.sql.* package,Accessing a Database from a JSP Page, Application – Specific Database Actions,Deploying JAVA Beans in a JSP Page, Introduction to struts framework..

Text Books:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNIT s 1,2 ,3)
2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH (Chapters: 19, 20, 21, 22, 25, 27) (UNIT 4)
3. Java Server Pages --Hans Bergsten, SPD O'Reilly (UNITs 5,6,7,8)

Reference Books:

1.Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
2. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly for chap 8.
3. Murach's beginning JAVA JDK 5, Murach, SPD
4. An Introduction to web Design and Programming --Wang-Thomson
5. Web Applications Technologies Concepts-Knuckles,John Wiley
6. Programming world wide web-Sebesta,Pearson
7. Building Web Applications-NIIT,PHI
8. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas
9. Beginning Web Programming-Jon Duckett WROX.
10. Java Server Pages, Pekowsky, Pearson.

I Year M.Tech (IT) **I Semester**

MTI 1.5.2 ADVANCED COMPUTER ARCHITECTURE (ELECTIVE-1)

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

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

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

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

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

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

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

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

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

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

I Year M.Tech (IT) **I Semester**

MTI 1.5.3 NETWORK SECURITY AND CRYPTOGRAPHY (ELECTIVE-I)

UNIT-I

Introduction:

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

Classical Techniques:

Conventional Encryption model, Steganography, Classical Encryption Techniques.

UNIT-II

Modern Techniques:

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

Algorithms:

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

UNIT-III

Conventional Encryption:

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

Public Key Cryptography:

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

UNIT-IV

Number theory:

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

Message authentication and Hash functions:

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

UNIT-V

Hash and Mac Algorithms:

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

Digital signatures and Authentication protocols:

Digital signatures, Authentication Protocols, Digital signature standards.

UNIT-VI

Authentication Applications:

Kerberos, X.509 directory Authentication service.

Electronic Mail Security:

Pretty Good Privacy, S/MIME.

UNIT-VII

IP Security:

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

Web Security:

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

UNIT-VIII

Intruders, Viruses and Worms:

Intruders, Viruses and Related threats.

Fire Walls:

Fire wall Design Principles, Trusted systems.

Text Books:

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

Reference Books:

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

I Year M.Tech (IT) **I Semester**

MTI 1.6.Middle Ware Technologies Lab and Data Warehousing & Mining Lab

PART A **MIDDLEWARE TECHNOLOGIES LAB**

1. Working with callbacks and delegates in C#

Demonstrates the use of delegates, callbacks, and synchronous and asynchronous method invocation, including how Microsoft .NET Framework classes provide explicit asynchronous support using the BeginXXXX and EndXXXX naming conventions and how you can make use of this support in your own code.

2. Code access security with C#

Demonstrates the use of .NET Framework Code Access Security, in which code can have permissions independent of the person executing the code.

3 Creating a COM+ component with C#

Demonstrates how to create a COM+ component, that takes advantage of Transaction management service within COM+, then assign a strong name to the assembly, register the assembly in the Global Assembly Cache, and register the component with COM+.

4 Creating a Windows Service with C#

Demonstrates how to create a Microsoft Windows Service that uses a File System Watcher object to monitor a specific directory for changes in files.

5 Read and Write Images to a SQL Server Database with C#

Demonstrates how to upload images into SQL Server by using standard HTML upload methods and then insert each image as a byte array into SQL Server.

6 Interacting with a Windows Service with C#

Develop a sample application that launches a Windows Form to allow the user to interact and manipulate the IIS Admin service on the local machine. The application should work by placing an icon in the System Tray.

7 Partitioning an Application into Multiple Assemblies with C#

Understand why it can be beneficial to create separate modules for an application download, and then demonstrates how to do so with C#.

8 Using System Printing in C# Applications

Develop a sample application that shows how to print a formatted report from sample data stored in an XML file using the PrintDocument class in the System.Drawing.Printing namespace. Also illustrates the user selection of a destination printer and multiple print fonts.

9 Using Reflection in C#

Demonstrate how to gather information on various types included in any assembly by using the System.Reflection namespace and some main .NET base classes.

10 Sending Mail with SmtpMail and C#

Uses a simple Web form to demonstrate how to use the SmtpMail class in the .NET Framework.

11 Perform String Manipulation with the String Builder and String Classes and C#

Demonstrates some basic string manipulation using both the String Builder and String classes.

12 Application Configuration Using Configuration Files and the Registry Using C#

A sample application that demonstrates methods of storing application settings by making use of both the system registry and application configuration files. Implements a custom configuration section to show how you can tailor these files to the specific needs of a particular application.

13 Using the System.Net.WebClient to Retrieve or Upload Data with C# .

PART B : Data Warehousing and Mining Lab

The objective of the lab exercises is to use data mining techniques to identify customer segments and understand their buying behavior and to use standard databases available to understand DM processes using WEKA (or any other DM tool)

1. **Gain insight for running pre- defined decision trees and explore results using MS OLAP Analytics.**

2. **Using IBM OLAP Miner – Understand the use of data mining for evaluating the content of multidimensional cubes.**

3. **Using Teradata Warehouse Miner – Create mining models that are executed in SQL.**

(BI Portal Lab: The objective of the lab exercises is to integrate pre-built reports into a portal application)

4. **Publish cognos cubes to a business intelligence portal.**

Metadata & ETL Lab: The objective of the lab exercises is to implement metadata import agents to pull metadata from leading business intelligence tools and populate a metadata repository. To understand ETL processes

5. **Import metadata from specific business intelligence tools and populate a meta data repository.**

6. **Publish metadata stored in the repository.**

7. **Load data from heterogenous sources including text files into a pre-defined warehouse schema.**

Case study

8. **Design a data mart from scratch to store the credit history of customers of a bank. Use this credit profiling to process future loan applications.**

9. **Design and build a Data Warehouse using bottom up approach titled 'Citizen Information System'. This should be able to serve the analytical needs of the various government departments and also provide a global integrated view.**

I Year M.Tech (IT) **I Semester**

MTI 1.7.NETWORK PROGRAMMING LAB

1. Write a C program that illustrates file-locking using semaphores.

2. Write a C program that implements a producer-consumer system with two processes. (Using semaphores)

3. Write a C program that illustrates inter process communication using shared memory system calls.

4. Write a C program that illustrates the following.
   a) Creating a message queue.
   a) Writing to a message queue.
   b) Reading from a message queue.

5. Write a C program to develop simple TCP client and server application using sockets (system calls).

6. Write a C program to develop simple UDP client and server application using sockets (system calls).

7. Write a C program to develop simple client and server application demonstrating multiplexing using **select** (system calls).

I Year M.Tech (IT) **II Semester**

MTI 2.1 INTERNETWORKING WITH TCP/IP

UNIT-I

Introduction to IP: Data gram, Fragmentation, option, checksum, IP Design, ARP and RARP – ARP, Design, RARP.

UNIT-II

Internet Control Message protocol : Types of Messages, Message format, Error reporting, query, checksum, ICMP Design.

Internet Group Management protocol – Multicasting, IGMP, Encapsulation, Multicast backbone, IGMP Design.

UNIT-III

Routing Protocols: Interior and Exterior routings, RIP, OSPF, BGP, Multicast routing.

UNIT – IV

BOOTP and DHCP : BOOTP, Packet Format, operation, UDP points, using TFTP, Delay agent DHCP Operation, Packet format.

FTP – Connections, communication, Command processing, file transfer, user interface and anonymous FTP.

UNIT-V

Trivial File transfer protocol : Messages, RPQ, WRQ, Data, ACK & RROR, Connector, Data transfer UDP Ports, Examples, Security application SMTP – User agent addresses, delayed delivery, Aliases, Mail transfer agent, commands and responses, Mail transfer phases MIME, POP.

UNIT-VI

Simple Network Management protocol : Compact, S MI, Name, Type, Encoding method, MIB, SNMP – Messages, Format Encoding, Examples,

HTTP – Transaction, Request messages, Response message, header, examples.

UNIT-VII

World Wide Web : Hypertext and Hypermedia, Browser architecture, Static documents, HTML, Dynamic documents, CGI, active documents, JAVA.

UNIT-VIII

IPV6 and ICMPV6 : IPV6, IPV6 addresses, IPV6 packet format, ICMPV6, Transition from IPV4 to IPV6

Text Book:

1. TCP/IP Protocol Suite - Third Edition, Behrouz A. Forouzan. TMH.

Reference Book:

1. Internetworking with TCP/IP Volume II, Third Edition – Douglas E. COMER/DAVID L.STEVENS, PHI.

I Year M.Tech (IT) **II Semester**

MTI 2.2 NETWORK MANAGEMENT SYSTEMS

UNIT-I:

Data communications and Network Management Overview: Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

UNIT-II:

SNMPV1 Network Management: Organization and Information and Information Models.
Managed network: Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model.

UNIT-III:

SNMPv1 Network Management: Communication and Functional Models
The SNMP Communication Model, Functional model

UNIT-IV:

SNMP Management: SNMPv2 :Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility With SNMPv1

UNIT-V:

SNMP Management: RMON: What is Remote Monitoring? , RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON

UNIT-VI:

Telecommunications Management Network: Why TMN? , Operations Systems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, An Integrated View of TMN, Implementation Issues.

UNIT-VII:

Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

UNIT-VIII:

Web-Based Management: NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network: , Future Directions

TEXT BOOKS:

1. Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.

Reference Books

1. Network management, Morris, Pearson Education.
2. Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
3. Distributed Network Management, Paul, John Wiley.

I Year M.Tech (IT) **II Semester**

MTI 2.3 INFORMATION RETRIEVAL SYSTEMS

UNIT-I:
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

UNIT-II:
Information Retrieval System Capabilities: Search, Browse, Miscellaneous

UNIT-III:
Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction.

UNIT-IV:
Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT-V:
Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

UNIT-VI:
Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT-VII:
User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext.
Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

UNIT-VIII:
Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.
Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

TEXTBOOKS:

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.

REFERENCE BOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrival By Yates Pearson Education.
3. Information Storage & Retieval By Robert Korfhage – John Wiley & Sons.

I Year M.Tech (IT) **II Semester**

MTI 2.4 DESIGN PATTERNS

UNIT –I:

Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT-II:

A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary .

UNIT-III:

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns,

UNIT-IV:

Structural Pattern Part-I: Adapter, Bridge, Composite.

UNIT-V:

Structural Pattern Part-II: Decorator, açade, Flyweight, Proxy.

UNIT-VI:

Behavioral Patterns Part-I: Chain of Responsibility, Command, Interpreter, Iterator.

UNIT-VII:

Behavioral Patterns Part-II: Mediator, Memento, Observer, State, Strategy, Template Method ,Visitor, Discussion of Behavioral Patterns.

UNIT-VIII:

What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

TEXT BOOKS:

1. Design Patterns By Erich Gamma, Pearson Education

REFERENCES:

1. Pattern's in JAVA Vol-I By Mark Grand ,Wiley DreamTech.
2. Pattern's in JAVA Vol-II By Mark Grand ,Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand ,Wiley DreamTech.
4. Head First Design Patterns By Eric Freeman-Oreilly-spd
5. Design Patterns Explained By Alan Shalloway,Pearson Education.

I Year M.Tech (IT) **II Semester**

MTI 1.5.1 HUMAN COMPUTER INTERACTION (ELECTIVE II)

UNIT-I
Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design,

UNIT-II
The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT-III
Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business junctions.

UNIT-IV
Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT-V
Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.

UNIT-VI
Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT-VII
Software tools – Specification methods, interface – Building Tools.

UNIT-VIII
Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia

REFERENCE BOOKS:

1. Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.

2. Interaction Design PRECE, ROGERS, SHARPS. Wiley Dreamtech,

3. User Interface Design, Soren Lauesen , Pearson Education.

I Year M.Tech (IT) **II Semester**

MTI 1.5.2 SOFTWARE TESTING METHODOLOGIES(ELECTIVE-II)

UNIT-I:

Introduction:- Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs

UNIT-II:

Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-III:

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-IV:

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT-V:

Paths, Path products and Regular expressions:- path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

UNIT-VI:

Logic Based Testing:- overview, decision tables, path expressions, kv charts, specifications.

UNIT-VII:

State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips.

UNIT-VIII:

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

TEXT BOOKS:

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

REFERENCE BOOKS:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

I Year M.Tech (IT) **II Semester**

MTI 1.5.3 MOBILE COMPUTING(ELECTIVE-II)

UNIT 1: Introduction to Network Technologies and Cellular Communications:
HIPERLAN: Protocol architecture, physical layer, Channel access control sub-layer, MAC sub-layer, Information bases and networking
WLAN: Infrared vs. radio transmission, Infrastructure and ad hoc networks, IEEE 802.11. Bluetooth.: User scenarios, Physical layer, MAC layer, Networking, Security, Link management
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.
Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture

UNIT 2: (Wireless) Medium Access Control:
Motivation for a specialized
MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT 3: Mobile Network Layer:
Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

UNIT 4: Mobile Transport Layer:
Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT 5: Database Issues:
Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT 6: Data Dissemination:
Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

UNIT 7: Mobile Ad hoc Networks (MANETs):
Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

UNIT 8:Protocols and Tools:

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

Text Books:

1). **Jochen Schiller**, "Mobile Communications", *Pearson Education*. (Chapters 4, 7, 9, 10, 11), second edition, 2004.

2) **Stojmenovic and Cacute,** "Handbook of Wireless Networks and Mobile Computing", *Wiley*, 2002, **ISBN** 0471419028.(Chapters 11, 15, 17, 26 and 27)

Reference Books:

1) Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004,

I Year M.Tech (IT) **II Semester**

MTI 1.5.4 EMBEDDED SYSTEMS (ELECTIVE-II)

Objectives:

To teach all about various aspects of Embedded systems design from Hardware & Software points of view.

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit-V

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

Unit VI

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

Unit VII

Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded

Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System. **(Chapter 8,9,10 and 11 from Text Book 3, Simon)**

Unit VIII

Introduction to advanced architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I^2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.

(Chapter 8 from Text Book 1, Wolf)

Text Books:

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

Reference Books:

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

I Year M.Tech (IT) **II Semester**

MTI 2.6. INTERNETWORKING WITH TCP/IP LAB

1. IP address calculation
2. Checksum calculation
3. Implementation of TFTP
4. Implementation of FTP
5. Implementation of THCP
6. Implementation of BOOTP
7. implementation of OSPF
8. implementation of CRC

I Year M.Tech (IT)

II Semester

MTI 2.7. DESIGN PATTERNS LAB

1. The student should take up the case study of Unified Library application which is mentioned in the theory, and Model it in different views i.e Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.
2. Using UML design Abstract factory design pattern.
3. Using Abstract factory Design pattern design car factory
4. Using UML design Adapter Design pattern
5. Using UML design Strategy Design pattern.
6. Using UML design Builder Design pattern
7. Using UML design Bridge Design pattern
8. Using UML design Decorator Design pattern
9. User gives a print command from a word document. Design to represent this chain of responsibility Design pattern.
10. Design a Flyweight Design Pattern
11. Using UML design Façade Design pattern
12. Using UML design Iterator Design pattern
13. Using UML design Mediator Design pattern
14. Using UML design Proxy Design pattern
15. Using UML design visitor Design pattern

Note: The above list is indicative and not exhaustive. Draw Sequence, timing and Class diagrams wherever applicable.

I Year M.Tech (IT) **II Semester**

MTI 2.7. DESIGN PATTERNS LAB

1. The student should take up the case study of Unified Library application which is mentioned in the theory, and Model it in different views i.e Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.
2. Using UML design Abstract factory design pattern.
3. Using Abstract factory Design pattern design car factory
4. Using UML design Adapter Design pattern
5. Using UML design Strategy Design pattern.
6. Using UML design Builder Design pattern
7. Using UML design Bridge Design pattern
8. Using UML design Decorator Design pattern
9. User gives a print command from a word document. Design to represent this chain of responsibility Design pattern.
10. Design a Flyweight Design Pattern
11. Using UML design Façade Design pattern
12. Using UML design Iterator Design pattern
13. Using UML design Mediator Design pattern
14. Using UML design Proxy Design pattern
15. Using UML design visitor Design pattern

Note: The above list is indicative and not exhaustive. Draw Sequence, timing and Class diagrams wherever applicable.