

**Department of Information Technology**  
**SCHOOL OF COMPUTER SCIENCE AND INFORMATICS**  
**SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY**

**M. Tech (Computer Networks and Information Security)**  
**Course Structure and Syllabus**

**I YEAR - I Semester**

Code	Subject	L	T	P	Credits	Max. Marks		Total
						Internal	External	
4R101	Data Structures and Algorithms	3	1	-	3	40	60	100
4R102	Network Programming	3	1	-	3	40	60	100
4R103	Advanced Computer Networks	3	1	-	3	40	60	100
4R104	Principles of Information Security	3	1	-	3	40	60	100
	<b>Professional Elective – I</b>	3	1	-	3	40	60	100
	<b>Professional Elective – II</b>	3	1	-	3	40	60	100
4R171	Network Programming Lab	-	-	4	2	40	60	100
4R172	Technical paper writing and Seminar	-	-	3	2	50	--	50
	<b>Total Credits</b>	<b>18</b>	<b>6</b>	<b>7</b>	<b>22</b>	<b>330</b>	<b>420</b>	<b>750</b>

Professional Elective – I		Professional Elective – II	
Code	Subject	Code	Subject
4R105	Software Engineering	4R108	Network Management System
4SC16	Image Processing and Pattern Recognition	4R109	Data Mining and Data Warehousing
4T217	Embedded Systems	4R110	Database Security
4S106	Information Retrieval System	4R111	Semantic web & Social Networks
4R116	Web Services and Service Oriented Architecture		

**I YEAR - II Semester**

Code	Subject	L	T	P	Credits	Max. Marks		Total
						Internal	External	
4RC12	Wireless Networks and Mobile Computing	3	1	-	3	40	60	100
4R213	Application of Network Security	3	1	-	3	40	60	100
4R214	Web Technologies	3	1	-	3	40	60	100
4R215	Information Security, Management and Standards	3	1	-	3	40	60	100
	<b>Professional Elective – III</b>	3	1	-	3	40	60	100
	<b>Open Elective</b>	3	1	-	3	40	60	100
4R273	Web Technologies and Network Security Lab.	-	-	4	2	40	60	100
4R274	Technical Seminar (Independent Review Paper)	-	-	3	2	50	--	-
	<b>Total Credits</b>	<b>18</b>	<b>6</b>	<b>7</b>	<b>22</b>	<b>330</b>	<b>420</b>	<b>750</b>

Professional Elective – III		Open Elective	
Code	Subject	Code	Subject
4R217	Web Security and Ethical Hacking	4ZC47	Entrepreneurship and Innovation
4SC08	Storage Area Networks	4Z203	Banking, Insurance and Risk Management
4R219	Mobile Application Development	4GC33	Intellectual Property rights, Values and Ethics
4S215	Cloud Computing		
4R220	Wireless Security		

**II YEAR – I Semester**

Code	Subject	L	P	Credits	Max. Marks		Total
					Internal	External	
4R375	Comprehensive Viva-voce	-	-	2	--	100	100
4R376	Project Seminar-1	-	-	2	50	--	50
4R377	Project Work (Part – I) (Project Status Report) (Excellent/ Good/ Satisfactory/ Unsatisfactory)	-	-	18	grading	--	--
	<b>Total Credits</b>	-	-	<b>22</b>	<b>50</b>	<b>100</b>	<b>150</b>

**II YEAR – II Semester**

Code	Subject	L	P	Credits	Max. Marks		Total
					Internal	External	
4R478	Project Seminar-2	-	-	2	50	--	50
4R479	Project Work & Dissertation (Excellent/Good/Satisfactory/Unsatisfactory)	-	-	20	--	--	--
	<b>Total Credits</b>	-	-	<b>22</b>	<b>50</b>	<b>--</b>	<b>50</b>

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**DATA STRUCTURES AND ALGORITHMS**

**4R101** **L T P C**  
**3 1 - 3**

**Unit I**

Basic concepts-Data types, Abstract Data Types, Data structures, Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Analysis-Big O, Omega and Theta notations.

**Unit II**

Linear data structures- Linear Lists, Sequential and Linked allocation ,The list ADT, array and linked Implementations, Singly Linked Lists-Operations-Insertion, Deletion, Doubly Linked

Lists- Operations- Insertion, Deletion, Stack ADT, definitions, operations, array and linked implementations, applications-infix to postfix conversion, recursion implementation, Queue ADT, definitions and operations ,array and linked Implementations, Circular Queues-insertion, deletion.

**Unit III**

Non Linear data structures- Trees – Basic Terminology, Binary tree, definition, array and linked representations, recursive and non-recursive traversals, Priority Queues-Definition, Operations, Realizing a Priority Queue using Heap.

Search Trees-Binary Search Trees, Definition, Operations- Searching, Insertion and Deletion, B-Trees, Definition, Operations- insertion and searching, Comparison of Search Trees.

Graphs – Basic Terminology, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals-DFS and BFS

**Unit IV**

Searching and Sorting- Linear Search, Hashing-Introduction, hash tables, hash functions, collision resolution methods.

Bubble Sort, Insertion Sort, Selection Sort, Heap Sort, Radix Sort, Divide and Conquer method-applications- Binary Search, Quick sort, Merge sort, Comparison of Searching and Sorting methods.

**Unit V**

Greedy method-Applications-Prim’s Algorithm for Minimum cost spanning trees, Kruskal’s Algorithm for Minimum cost Spanning trees, Job Sequencing with dead lines, Single Source Shortest path problem.

Dynamic Programming-General method, Applications-Multi stage Graphs, Optimal Binary Search trees,0/1 Knapsack Problem, All Pairs Shortest Path Problem, Traveling Sales Person Problem.

**Unit VI**

Backtracking-General method, Applications-n-queens problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

Branch and Bound-General method, Applications-Traveling sales person problem,0/1 Knapsack problem,FIFO and LC Branch and Bound solutions.

**TEXT BOOKS :**

1. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Satraj Sahni

and S.Rajasekharan, Universities Press,2008.

2. Design and Analysis of Algorithms, P.H.Dave, H.B.Dave, Pearson Education,2008.

**REFERENCE BOOKS:**

1. Data Structures , Algorithms and Applications in Java,2<sup>nd</sup> edition,S.Sahani, Universities Press.

2. Data Structures and algorithms in Java, 3<sup>rd</sup> edition, Adam Drozdek, Cengage Learning.

3. Data structures and algorithms in Java,3<sup>rd</sup> edition,M.T.Goodrich,R.Tamassia,Wiley-India.

4. Data Structures using Java, D.S. Malik and P.S.Nair, Cengage Learning.

5. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson Education,2004.

6. Introduction to Algorithms,3<sup>rd</sup> Edition,T.H.Cormen,C.E.Leiserson,R.L.Rivest,C.Stein,PHI.

7. Data Structures with Java,W.H.Ford and W.R.Topp,Pearson Education.

8. A Practical Guide to Data Structures and Algorithms using Java, S.Goldman & K.Goldman,Chapman & Hall/CRC, Taylor & Francis Group.

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**NETWORK PROGRAMMING**

**4R102**

**L    T    P    C**  
**3    1    -    3**

**UNIT – I**

Linux Utilities- File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking utilities, Filters, Text processing utilities and Backup utilities.

Bourne again shell(bash) - Introduction, pipes and redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples.

**UNIT – II**

Process- Process concept, Kernel support for process, process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process, Process APIs, Multithreaded Programming - Differences between threads and processes, Thread structure and uses, POSIX Thread APIs, Creating Threads, Thread Attributes.

Files- File Concept, File System Structure, Inodes, File Attributes, File types, Library functions, I/O in C, stream errors, kernel support for files, Low level file access - File structure related system calls(File APIs), file and directory management - Directory file APIs, Symbolic links & hard links.

**UNIT – III**

Signals- Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

Interprocess Communication - Introduction to IPC, Pipes, FIFOs, message queues, semaphores and shared memory.

Message Queues- Kernel support for messages, Unix system V APIs for messages, client/server example.

Semaphores-Kernel support for semaphores, Unix system V APIs for semaphores.

Shared Memory- Kernel support for shared memory, Unix system V APIs for shared memory.

**UNIT – IV**

Network IPC - Introduction to Unix Sockets, Address formats, Socket system calls for Connection Oriented - Communication -Socket, bind, listen, accept, send, recv, Socket system calls for Connectionless-Communication-socket,connect,sendto,recvfrom,Example-Client/ServerPrograms, Socket options - setsockopt, getsockopt, fcntl.

**UNIT – V**

Review of Java - Fundamentals of Java, Classes and Objects, Inheritance, Interfaces and Packages, Exception handling, Files, Multithreaded Programming.

**UNIT-VI**

Network Programming in Java-Network basics, TCP sockets, UDP sockets(datagram sockets),Server programs that can handle one connection at a time and multiple connections(using multithreaded server),Remote Method Invocation(Java RMI)-Basic RMI Process, Implementation details-Client-Server Application.

**TEXT BOOKS:**

1. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.(Unit I)
2. Java Network Programming,3<sup>rd</sup> edition, E.R. Harold, SPD, O'Reilly.(Unit V)
3. Unix Network Programming ,W.R. Stevens, PHI/Pearson Education.(Units II,III,IV)

**REFERENCE BOOKS:**

1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the Unix environment, 2<sup>nd</sup> Edition, W.R.Stevens, Pearson Education.
3. Unix for programmers and users, 3<sup>rd</sup> Edition, Graham Glass, King Ables, Pearson Education.
4. Beginning Linux Programming, 4<sup>th</sup> Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
5. Unix Network Programming The Sockets Networking API,Vol.-I,W.R.Stevens,Bill Fenner,A.M.Rudoff,Pearson Education.
6. Unix Internals,U.Vahalia,Pearson Education.
7. Unix shell Programming,S.G.Kochan and P.Wood,3<sup>rd</sup> edition,Pearson Education.
8. Unix System Programming using C++, T.Chan, PHI.(Units II,III,IV)
9. An Introduction to Network Programming with Java,Jan Graba,Springer,rp 2010.(Unit V)
10. The complete Reference Java 7<sup>th</sup> Edition , Herbert Schildt, TMH.(Part of Unit I)

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**ADVANCED COMPUTER NETWORKS**

4R103

L    T    P    C  
          3    1    -    3

**UNIT I**

**Computer Networks and the Internet:** What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet – **(Chapter 1) of T1.**

**Foundation of Networking Models:** 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM - **(Chapter 2) of T2.**

**UNIT II**

**The Link Layer and Local Area Networks:** Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Ethernet – **(Chapter 5) of T1**

**Unit - III**

**Routing and Internetworking:** Network-Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer – **(Chapter 7) of T2**

**UNIT IV**

**Logical Addressing:** IPv4 Addresses, IPv6 Addresses - **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – **(Chapter 19, 20) of T3**

**Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control – **(Chapter 8) of T2**

**Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing – **(Chapter 2) of T1**

**UNIT V**

**Wireless Networks and Mobile IP:** Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - **Mobile Ad-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks – **Wireless Sensor Networks** and Protocol Structures - **(Chapter 6, 19, 20) of T2**

**UNIT VI**

**VPNs, Tunneling and Overlay Networks:** Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – **VoIP and Multimedia Networking:** Overview of IP Telephony – **(Chapters 16, 18) of T2**

**TEXT BOOKS:**

1. Computer Networking: A Top-Down Approach Featuring the Internet, *James F. Kurose, Keith W. Ross*, Third Edition, Pearson Education, 2007
2. Computer and Communication Networks, *Nader F. Mir*, Pearson Education, 2007

#### REFERENCE BOOKS:

1. An Engineering Approach to Computer Networking , *S.Keshav*, Pearson Education, 1997
2. Computer Networks: Principles, Technologies And Protocols For Network Design, *Natalia Olifer, Victor Olifer*, Wiley India, 2006.
3. Computer Networks, *Andrew S. Tanenbaum*, Fourth Edition, Prentice Hall.
4. Fundamentals of Business Data Communications, Jerry FitzGerald and Alan Dennis, Tenth Edition, Wiley, 2009.
5. Campus Network Design Fundamentals, *Diane Teare, Catherine Paquet*, Pearson Education (CISCO Press)
6. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, Tata McGraw Hill, 2007



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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**PRINCIPLES OF INFORMATION SECURITY**

**4R104** **L T P C**  
**3 1 - 3**

**UNIT – I**

**Information Security:** Introduction, The need for security, Security approaches and goals, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

**UNIT – II**

**Cryptography:** Concepts and Techniques, Differential and Linear Cryptanalysis, symmetric and asymmetric key cryptography, steganography, **Mathematics of Cryptography:** integer and modular arithmetic, matrices, linear congruence, Euclids algorithm, Primality testing, Factorization, Chinese remainder theorem

**UNIT – III**

**Symmetric key Ciphers:** Block and Stream Cipher principles, DES structure, DES Analysis, Security of DES, variants of DES, Block cipher modes of operation , AES structure, Analysis of AES , Key distribution **Asymmetric key Ciphers:** Principles of public key cryptosystems, RSA algorithm, Analysis of RSA, Diffie-Hellman Key exchange

**UNIT – IV**

**Cryptographic Hash:** Introduction, Properties, Generic cryptographic hash, MD5, SHA -512, **Key Management:** Introduction, Digital certificates and types, X.509, PKI, **Authentication:** One-way authentication, Mutual authentication, Centralized authentication, Kerberos, Biometrics

**UNIT – V**

**Security at layers(Network, Transport, Application):** IPSec, Secure Socket Layer(SSL), Transport Layer Security(TLS), Secure Electronic Transaction(SET), Pretty Good Privacy(PGP), S/MIME

**UNIT – VI**

**Intruders, Virus and Firewalls:** Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls **Case Studies on Cryptography and security:** Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections

**TEXT BOOKS:**

1. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2<sup>nd</sup> Edition
2. Cryptography and Network Security : William Stallings, Pearson Education, 4<sup>th</sup> Edition

**REFERENCE BOOKS:**

1. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning
2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2<sup>nd</sup> Edition
3. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
4. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
5. Discrete Mathematics for Computer Scientists: cliff Stein, Robert Drysdale, Keneth Bogart, Pearson Education, 1<sup>st</sup> Edition.

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**M.Tech I YEAR I SEMESTER**  
**Computer Networks and Information Security**  
**SOFTWARE ENGINEERING**  
**(Professional Elective-I)**

**4R105** **L**    **T**    **P**    **C**  
**3**    **1**    **-**    **3**

**UNIT I**

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

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

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

**UNIT II**

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

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

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

**UNIT III**

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

Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design, assessing alternative architectural designs, mapping data flow into a software architecture.

**UNIT IV**

Modeling component-level design : Designing class-based components, conducting component-level design, Object constraint language, designing conventional components.

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

**UNIT V**

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

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

Metrics for Process and Products: Software Measurement, Metrics for software quality.

**UNIT VI**

Risk management: Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

**TEXT BOOKS:**

1. Software Engineering :A practitioner’s Approach, Roger S Pressman, sixth edition. McGrawHill International Edition, 2005
2. Software Engineering, Ian Sommerville, seventh edition, Pearson education, 2004.

## REFERENCE BOOKS:

1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition , 2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications, 2008.
8. Software Engineering Principles and Practice, Hans Van Vliet, 3<sup>rd</sup> edition, John Wiley & Sons Ltd.
9. Software Engineering 3: Domains, Requirements, and Software Design, D. Bjorner, Springer International Edition.
10. Introduction to Software Engineering, R.J. Leach, CRC Press.

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**M.Tech I YEAR I SEMESTER**  
**Computer Networks and Information Security**  
**IMAGE PROCESSING AND PATTERN RECOGNITION**  
**(Professional Elective-I)**

<b>4SC16</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
	<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>	

**UNIT – I**

Fundamental steps of image processing, components of an image processing of system. The image model and image acquisition, sampling and quantization, relationship between pixels, distance functions, scanner.

**UNIT – II**

Statistical and spatial operations, Intensity functions transformations, histogram processing, smoothing & sharpening – spatial filters Frequency domain filters, homomorphic filtering, image filtering & restoration. Inverse and weiner filtering, FIR weiner filter, Filtering using image transforms, smoothing splines and interpolation.

Morphological and other area operations, basic morphological operations, opening and closing operations, dilation erosion, Hit or Miss transform, morphological algorithms, extension to grey scale images.

**UNIT- III**

Segmentation and Edge detection region operations, basic edge detection, second order detection, crack edge detection, gradient operators, compass and laplace operators, edge linking and boundary detection, thresholding, regionbased segmentation, segmentation by morphological watersheds.

**UNIT –IV**

Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression, image data compression-predictive technique, pixel coding, transfer coding theory, lossy and lossless predictive type coding, Digital Image Water marking.

**UNIT –V**

Representation and Description

Chain codes, Ploygonal approximation, Signature Boundary Segments, Skeltons, Boundary Descriptors, Regional Descriptors, Relational Descriptors, Principal components for Description, Relational Descriptors

**UNIT VI**

**Pattern Recognition Fundamentals:** Basic Concepts of pattern recognition, Fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model

**Pattern classification:**

Pattern classification by distance function: Measures of similarity, Clustering criteria, K-means algorithm, Pattern classification by likelihood function: Pattern classification as a Statistical decision problem, Bayes classifier for normal patterns.

**TEXT BOOKS:**

1. Digital Image Processing Third edition, Pearson Education,Rafael C. Gonzalez, Richard E. Woods
2. Pattern recognition Principles: Julus T. Tou, and Rafel C. Gonzalez, Addison-Wesly Publishing Company

**REFERENCE BOOKS:**

1. Image Processing, Analysis and Machine Vision, Second Edition, Milan Sonka, Vaclav Hlavac and Roger Boyle, Cengage learning.
2. Digital Image Processing, W.K.Pratt, 4<sup>th</sup> edition John Wiley & Sons.
3. Fundamentals of digital image processing, A.K. Jain, PHI
4. Pattern classification, Richard Duda, Hart and David Stork John Wiley publishers.
5. Digital Image Processing, S.Jayaraman, S.Esakkirajan, T.Veerakumar, TMH.
6. Pattern Recognition, R.Shinghal, Oxford University Press.

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**EMBEDDED SYSTEMS**  
**(Professional Elective-I)**

**4T217** **L T P C**  
**3 1 - 3**

**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).

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 III**

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

**UNIT IV**

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 V**

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).

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 & 11 from Text Book 3, Simon).

**UNIT VI**

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

**TEXT BOOKS**

1. Computers as Components-principles of embedded computer system design, Wayne Wolf, Elsevier.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

**REFERENCES**

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.
6. An Embedded Software Primer, David E. Simon, Pearson Education.

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**M.Tech I YEAR I SEMESTER**  
**Computer Networks and Information Security**  
**INFORMATION RETRIEVAL SYSTEMS**  
(Professional Elective-I)

4S106 L T P C  
3 1 - 3

**UNIT I**

**Introduction:** Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses, **Information Retrieval System Capabilities** - Search, Browse, Miscellaneous.

**UNIT II**

**Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction, **Data Structures:** Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure

**UNIT III**

**Automatic Indexing:** Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages **Document and Term Clustering:** Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters -

**UNIT IV**

**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 V**

**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.

**UNIT VI**

**Multimedia Information Retrieval** – Models and Languages – Data Modeling, Query Languages, Indexing and Searching - **Libraries and Bibliographical Systems** – Online IR Systems, OPACs, Digital Libraries.

**TEXT BOOKS:**

1. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark T Maybury, Springer.
2. Modern Information Retrieval, Ricardo Baeza-Yates, Pearson Education, 2007.

**REFERENCE BOOKS:**

1. Information Retrieval Data Structures and Algorithms, William B Frakes, Ricardo Baeza-Yates, Pearson Education, 1992.
2. Information Storage & Retrieval, Robert Korfhage, John Wiley & Sons.
3. Introduction to Information Retrieval, Christopher D. Manning and Prabhakar Raghavan, Cambridge University Press, 2008.
4. Information Retrieval: Algorithms and Heuristics, David A Grossman and Ophir Frieder, 2<sup>nd</sup> Edition, Springer, 2004.

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**WEB SERVICES and SERVICE ORIENTED ARCHITECTURE**  
**(Professional Elective-I)**

**4R116**

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**UNIT I**

Evolution and Emergence of Web Services – Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

**UNIT II**

Web Service Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services. Describing Web Services – WSDL introduction, non functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.

**UNIT III**

Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation. SOAP : Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging, The enterprise Service Bus, SOA Development Lifecycle, SOAP HTTP binding, SOAP communication model, Error handling in SOAP.

**UNIT IV**

Registering and Discovering Services : The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation, UDDI with WSDL, UDDI specification, Service Addressing and Notification, Referencing and addressing Web Services, Web Services Notification.



## UNIT V

SOA and web services security considerations, Network-level security mechanisms, Application-level security topologies, XML security standards, Semantics and Web Services, The semantic interoperability problem, The role of metadata, Service metadata,

## UNIT VI

Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frameworks, Web service management, Richer schema languages, WS-Metadata Exchange.

### TEXT BOOKS:

1. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.
2. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.
3. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.

### REFERENCE BOOKS:

1. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
  2. Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.
  3. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly, SPD.
  4. McGovern, et al., "Java web Services Architecture", Morgan Kaufmann Publishers, 2005.
  5. J2EE Web Services, Richard Monson-Haefel, Pearson Education.
- M. TECH. COMPUTER SCIENCE

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**M. Tech I year I semester**  
**Computer Networks and Information Security**  
**NETWORK MANAGEMENT SYSTEM**  
**(Professional Elective-II)**

**4R108**

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**UNIT I**

**Introduction to Network Management**

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**

**SNMP v1 Network Management: Organization and Information Models**

The History of SNMP Management The SNMP Mode, The Organization Model, System Overview, The Information Model. The SNMP Communication Model, Functional model.

**UNIT III**

**SNMP Management: SNMP v2**

Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information , The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMP v1.

**UNIT IV**

**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, and Enterprise Management Solutions.

**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.

**UNIT V**

**Performance Modeling and Estimation**

Overview of Probability and Stochastic Processes – Probability, Random Variables Stochastic Processes, Queuing Analysis - How Queues Behave—A Simple Example Why Queuing Analysis. Queuing Models, Single-Server Queues. Multi server Queues, Examples, Queues with Priorities, Networks of Queues, Other Queuing Models. Estimating Model Parameters.

**Modeling and Estimation of Self-Similar Traffic**

Self-Similar Traffic - Self-Similarity, Self-Similar Data Traffic, Examples of Self-Similar Data Traffic, Performance Implications of Self-Similarity. Modeling and Estimation of Self-Similar Data Traffic.

**UNIT VI**

**Quality of Service in IP Networks**

Exterior Routing Protocols and Multicast - Path-Vector Protocols: BGP and IDRP. Multicasting, Integrated and Differentiated Services - Integrated Services Architecture (ISA), Queuing Discipline, Random Early Detection. Differentiated Services, Protocols for QOS Support - Resource Reservation: RSVP. Multi protocol Label Switching, Real-Time Transport Protocol (RTP)

**TEXT BOOKS:**

1. Mani Subramanian, "Network Management, Principles and Practice", Second edition, Pearson Education, 2010.
2. William Stallings, "High-Speed Networks and Internets: Performance and Quality of Service – Second edition", Pearson Education, 2002.

**REFERENCE BOOKS:**

1. Benoit Claise and Ralf Wolter, "Network Management: Accounting and Performance Strategies", Pearson Education, 2008.
2. J. Richard Burke, "Network Management – Concepts and Practice: A Hands-on Approach", First edition, Pearson Education, 2008.
3. Stephen B. Morris, "Network Management, MIBs and MPLS", First edition, Pearson Education, 2003.
4. Anurag Kumar, D.Manjunath and Joy Kuri, "Communication Networking: An Analytical Approach", Elsevier, 2004.
5. Thomas G. Robertazzi, "Computer Networks and Systems – Queuing Theory and Performance Evaluation", Third edition, Springer, 2006.
6. Engineering Internet Qos, Sanjay Jha and Mahbub Hassan, Artech House, 2002
7. Gary N. Higginbottom, "Performance Evaluation of Communication Networks", Artech House, 1998.

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**DATA MINING AND DATA WAREHOUSING**  
**(Professional Elective-II)**

4R109

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**UNIT I**

**Introduction:** Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Issues in Data Mining.

**Data Preprocessing:** Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT II**

**Data Warehouse and OLAP Technology for Data Mining:** Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Usage of Data Warehousing Online Analytical Processing and Mining

**UNIT III**

**Data Cube Computation:** Efficient Methods for simple Data Cube Computation (Full Cube, Iceberg Cube, Closed Cube and Shell Cube), Discovery Driven exploration of data cubes, Attribute-Oriented Induction for data characterization and its implementation

**UNIT IV**

**Mining Frequent Patterns, Associations and Correlations:** Basic Concepts, The Apriori algorithm for finding frequent itemsets using candidate generation, Generating association rules from frequent itemsets, Mining frequent itemsets without candidate generation, Mining various kinds of Association Rules, Correlation Analysis

**UNIT V**

**Classification and Prediction:** Description and comparison of classification and prediction, preparing data for Classification and Prediction

Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation

Prediction, linear and non-linear regression, evaluating accuracy of a Classifier or a Predictor

**UNIT VI**

**Cluster Analysis:** Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, k-means and k-medoids methods, CLARANS, Agglomerative and divisive hierarchical clustering, chameleon dynamic modeling, clustering based on density distribution function, wavelet transformation based clustering, conceptual Clustering, Constraint-Based Cluster Analysis, Outlier Analysis.

**TEXT BOOKS:**

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, 2<sup>nd</sup> Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

**REFERENCE BOOKS:**

1. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia.
2. Insight into Data Mining, K.P.Soman, S.Diwakar, V.Ajay, PHI, 2008.
3. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition
4. The Data Warehouse Life cycle Tool kit – Ralph Kimball Wiley student edition
5. Building the Data Warehouse By William H Inmon, John Wiley & Sons Inc, 2005.

6. Data Mining Introductory and advanced topics –Margaret H Dunham, Pearson education
7. Data Mining Techniques – Arun K Pujari,2<sup>nd</sup> edition, Universities Press.
8. Data Mining,V.Pudi and P.Radha Krishna,Oxford University Press.
9. Data Mining:Methods and Techniques,A.B.M Shawkat Ali and S.A.Wasimi,Cengage Learning.
10. Data Warehouse 2.0,The Architecture for the next generation of Data Warehousing,W.H.Inmon,D.Strauss,G.Neushloss,Elsevier,Distributed by SPD.

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**DATABASE SECURITY**  
**(Professional Elective-II)**

4R110

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**UNIT - I**

**Introduction:** Introduction to Databases, Security Problems in Databases, Security Controls Conclusions.

**UNIT - II**

**Security Models:** Introduction Access Matrix Model, Take-Grant Model, Acten Model, PN Model, Hartson and Hsiao's Model, Fernandez's Model, Bussolati and Martella's Model for Distributed databases, Bell and LaPadula's Model, Biba's Model, Dion's Model, Sea View Model, Jajodia and Sandhu's Model, The Lattice Model for the Flow Control.

**UNIT - III**

**Security Mechanisms:** Introduction User Identification/Authentication, Memory Protection, Resource Protection, Control Flow Mechanisms, Isolation Security Functionalities in Some Operating Systems, Trusted Computer, System Evaluation Criteria.

**UNIT - IV**

**Security Software Design:** Introduction, A Methodological Approach to Security. Software Design, Secure Operating System, Design Secure DBMS Design, Security Packages, Database Security Design.

**UNIT - V**

**Statistical Database Protection & Intrusion Detection Systems:** Introduction Statistics Concepts and Definitions, Types of Attacks, Inference Controls evaluation Criteria for Control Comparison, Introduction IDES System, RETISS System, ASES System, Discovery.

**UNIT - VI**

**Models for the Protection of New Generation Database Systems:** Introduction, A Model for the Protection of Frame Based Systems, A Model for the Protection of Object-Oriented Systems , SORION Model for the Protection of Object-Oriented Databases, A Model for the Protection of New Generation Database Systems, The Orion Model Jajodia and Kogan's Model, A Model for the Protection of Active Databases.

**Suggested Reading:**

- 1) S. Castano, M. Fugini, G. Martella, P. Samarati (eds.), Database Security, Addison-Wesley, 1994.
- 2) RonBen Natan, Implementing Database Security and Auditing, Elsevier, Indian reprint 2006
- 3) Michael Gertz, Sushil Jajodia, Handbook of Database Security : Applications and Trends, Springer, 2008

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**SEMANTIC WEB AND SOCIAL NETWORKS**  
**(Professional Elective-II)**

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**Unit I: Web Intelligence**

Thinking and Intelligent Web Applications, The Information Age , The World Wide Web, Limitations of Today's Web, The Next Generation Web

**Unit II: Machine Intelligence**

Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

**Unit III: Knowledge Representation for the Semantic Web**

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL),UML,XML/XML Schema.

**Unit IV: Ontology Engineering**

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

**Unit V: Semantic Web Applications, Services and Technology**

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

**Unit VI: Social Network Analysis and semantic web**

What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

**TEXT BOOKS:**

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience,2008.
2. Social Networks and the Semantic Web ,Peter Mika,Springer,2007.

**REFERENCE BOOKS:**

1. Semantic Web Technologies ,Trends and Research in Ontology Based Systems, J.Davies,Rudi Studer,Paul Warren,JohnWiley&Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
- 4.Programming the Semantic Web,T.Segaran,C.Evans,J.Taylor,O'Reilly,SPD.
- 5.A Semantic Web Primer,G.Antoniou and V.Harmelen,PHI.

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**NETWORK PROGRAMMING LAB**

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**a) Sample Problems on Computer Networks:**

1. Implement the data link layer framing methods such as character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP .
3. Implement Dijkstra 's algorithm to compute the Shortest path through a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm.
5. Take an example subnet of hosts. Obtain broadcast tree for it.
6. Take a 64 bit plain text and encrypt the same using DES algorithm.
7. Write a program to break the above DES coding.
8. Using RSA algorithm, Encrypt text data and Decrypt the same.

**b) Sample Problems on Network Programming:**

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
- \*6. Write a shell script that accepts any number of arguments and prints them in the reverse order.
7. Write a shell script that determines the period for which a specified user is working on the system.
8. Write a shell script to list all of the directory files in a directory.
9. Write an interactive file-handling shell program- Let it offer the user the choice of copying, removing or linking files. Once the user has made a choice, have the program ask him for the necessary information such as the file name, new name and so on.
10. Write a shell script to find factorial of a given integer.
11. Write a shell script to find the G.C.D. of two integers.
12. Write a shell script to generate a multiplication table.
13. Write a shell script that copies multiple files to a directory.
14. Write a shell script that counts the number of lines and words present in a given file.
15. Write a shell script that displays the list of all files in the given directory.
- \*16. Write a shell script (small calculator) that adds, subtracts, multiplies and divides the given two integers. There are two division options: one returns the quotient and the other returns remainder. The script requires 3 arguments: The operation to be used and two integer numbers. The options are add (-a), subtract (-s), multiply (-m), quotient (-c) and remainder (-r).
- \*17. Write a shell script to reverse the rows and columns of a matrix.
- \*18. Write a sed command that deletes the first character in each line in a file.
- \*19. Write sed command that deletes the character before the last character in each line a file.
- \*20. Write a sed command that swaps the first and second words in each line of a file.



- \*21. Write an awk script that reads a file of which each line has 5 fields – ID, NAME, MARKS1, MARKS2, MARKS3 and finds out the average for each student. Print out the average marks with appropriate messages.
- \*22. Write an awk script to find the factorial of a user supplied number.
- \*23. ls -l command produces long listing of files. Write an awk script 1) to print the selected fields (Ex: size and name of the files) from the file listing. 2) to print the size of all files and number of files.
- \*24. Write an awk script to count the number of lines in a file that do not contain vowels.
- \*25. Write an awk script to find the number of characters, words and lines in a file.
- \*26. Write a perl script to find the average of a set of numbers using a function.
- \*27. Write a perl script to find the number of characters and words in a given sentence. to print the sentence after reversing it.
- \* 28. Write a perl program that prompts for and reads a string and a number (on separate lines of input) and prints out the string the number of times indicated by the number on separate lines.
- \* 29. Write a perl program that reads a series of words (with one word per line) until end of input, then prints a summary of how many times each word was seen.
- \* 30. Write a perl program that prints each line of its input that contains a period(.), ignoring other lines of input. Try it on small text file.
- \*31. Write a perl program that makes a modified copy of a text file. In the copy, every string Fred (case insensitive) should be replaced with Larry. (So, “Manfred Mann” should become “MannLarry Mann”). The input file name should be given on the command line, and the output file name should be the corresponding file name ending with “.out”.
- \* 32. Write a perl program that takes a list of files named on the command line and reports for each one whether it is readable, writable, executable, or doesn’t exist.
- \* 33. Write a perl program that works like rm, deleting any files named on the command line.
- \* 34. Write a perl program that works like mv, renaming the first command line argument to the second command line argument.
- \* 35. Write a perl program to find any symbolic links in the current directory and print out their values.
- \* 36. Write a perl program to read in a list of numbers and sort them.
- \* 37. Write a perl program that looks through a given string for every occurrence of a given substring , printing out the positions where the substring is found.
- \* 38. Write a perl program that changes to some particular directory, like the systems’ root directory, and executes the ls -l command to get a long format directory listing in that directory.
- 39. Write a C program that makes a copy of a file using standard I/O and system calls.
- 40. Write a C program that counts the number of blanks in a text file Using standard I/O Using system calls.
- 41. Implement in C the following Unix commands using system calls  
A) cat                    B) ls                    C) mv
- 42. Write a C program that takes one or more file/directory names as command line input and reports the following information on the file.  
A) File type.                    B) Number of links.  
C) Time of last access.    D) Read, Write and Execute permissions.
- 43. Write a C program to emulate the Unix ls -l command.
- 44. Write a C program that creates a directory, puts a file into it, and then removes it.
- 45. Write a C program that searches for a file in a directory and reports whether the file is present in the directory or not.
- 46. Write a C program to list for every file in a directory, its inode number and file name.
- 47. Write a C program that creates a file containing hole which is occupying some space but having nothing.
- 48. Write a C program that demonstrates redirection of standard output to a file.Ex: ls > f1.
- 49. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.
- 50. Write a C program to create a Zombie process.
- 51. Write a C program that illustrates how an orphan is created.
- 52. Write a C program that creates a child process to execute a command. The command to be executed is passed on the command line.
- 53. Write a C program that accepts two small numbers as arguments and then sums the two numbers in a child process. The sum should be returned by child to the parent as its exit status and the parent should print the sum.

54. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex:- `ls -l | sort`
55. Write C programs that illustrate communication between two unrelated processes using named pipe.
56. Write a C program in which a parent writes a message to a pipe and the child reads the message.
57. Write a C program that illustrates suspending and resuming processes using signals.
- \*58. Write a C program that displays the real time of a day every 60 seconds, 10 times.
- \*59. Write a C program that runs a command that is input by the user and prints the exit status if the command completes in 5 seconds. If it doesn't, then the parent uses kill to send a SIGTERM signal to kill the child process.
60. Write a C program that illustrates file-locking using semaphores.
61. Write a C program that implements a producer-consumer system with two processes. (Using semaphores).
62. Write client and server programs (using C ) for
  - i) interaction between server and client processes using Unix Domain Sockets.
  - ii) Interaction between server and client processes using Internet Domain Sockets.
63. Write a C program (sender.c) to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.
64. Write a C program (receiver.c) that receives the messages (from the above message queue as specified in 63 and displays them.
65. Write C program that illustrates two processes communicating via shared memory.
66. Write Java programs (Server and Client) for the following:  
The Server receives the message sent by the client and then retransmits the same message to the client.(Use Sockets)
67. Write a Socket-based Java program that implements a simple client/server application. When Server receives a message from a client,it simply converts the message into all lower case letters and sends back the same to the client.The client displays the message on the console.
68. Write a Java program to connect to a database and retrieve all the data.
69. Write a Java Program for the following:  
The Client sends a datagram to the Server.The Server receives the datagram and generates another datagram in response to it.
70. Write a Server program that will receive the filename from the client,retrieve it and send the contents of file to the client.
71. Write a Java program to implement an RMI Client/Server application.
72. Write an UDP-based Client-side applet to send the side of a Square to the server.Write the Server-side applet such that it receives the side,computes the area and finally returns to the client.
73. Write a Java program that copies a file using RMI.
74. Write a multithreaded server which will pass whatever message line it will receive from a client to all the other clients that are connected.Write a client program to connect to this Server,which sends its lines and receives the lines sent by the other clients.
75. Write a remote calculator program that adds,subtracts, and multiplies two numbers.These operations should be invoked remotely by a client method.
76. Create an UDP echo Client/Server application,wherein whatever is written to a UDP server is written back to the client.

Note: \* These problems are not mandatory

#### REFERENCE BOOKS:

1. Advanced Unix Programming, N.B.Venkateswarulu, BS Publications.
2. Unix and Shell programming, B.A.Forouzan and R.F.Gilberg, Thomson,2003.
3. Unix and Shell Programming, M.G. Venkatesh Murthy, Pearson Education, 2005.
4. Unix Shells by Example, 4th Edition, Ellie Quigley, Pearson Education.
5. \*Learning Perl, R.L.Schwartz, T. Phoenix & B.D. Foy, 4th Edition, O'Reilly(SPD).
6. \*Perl by Example, 4th Edition, E.Quigley, Pearson Education.
7. \*Sed and Awk, O.Dougherty&A.Robbins,2<sup>nd</sup> edition,SPD.
8. Programming with Java,C.Muthu,Cengage Learning.
9. Object Oriented Programming through Java,P.Radha Krishna,Universities Press.
10. Programming in Java,S.Malhotra&S.Choudhary,Oxford Univ. Press.

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**M.Tech I year I semester**  
**Computer Networks and Information Security**  
**TECHNICAL PAPER WRITING AND SEMINAR**

**4R172**

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There shall be two seminar presentations during I year I semester and I year II Semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee, which shall consist of the Head of the Department, a senior Faculty Member and the Supervisor and will jointly evaluate the report and presentation. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful.

In the First semester the report must be in the form of the review paper with a format used by IEEE / ASME etc. In the Second semester Technical Seminar in the form of Independent Review Paper must be of high quality fit for publication in a reputed conference / journal.

**The evaluation format for seminar is as follows:**

- Day to day evaluation by the Supervisor : 10 marks
- Final Report : 10 marks
- Presentation : 30 marks

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**WIRELESS NETWORKS AND MOBILE COMPUTING**

4RC12

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**UNIT I :**

**INTRODUCTION TO MOBILE & WIRELESS COMMUNICATION:** Mobile communication, Mobile computing, Architecture, Mobile Devices, Mobile System Networks, Components of Wireless Environment, Overview & Challenges of Wireless Networks, Categories of Wireless Networks Wireless LAN : Infra red Vs radio transmission, Infrastructure and Ad-hoc Network

**UNIT II**

**GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS (GSM):** GSM Architecture, GSM Entities, Call Routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security **GENERAL PACKET RADIO SERVICE (GPRS):** Introduction, GPRS and packet data network, GPRS network architecture, GPRS network operations, Data services in GPRS, Applications and limitations of GPRS, Billing and charging in GPRS

**UNIT III:**

**MOBILE NETWORK LAYER:** Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP), Mobile Ad-hoc networks : Routing, destination Sequence Distance Vector, Dynamic Source Routing.

**UNIT IV:**

**MOBILE TRANSPORT LAYER:** Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

**UNIT V:**

**DATABASES:** Database Hoarding Techniques, Data Caching, Client-server computing Adaptation, Transaction models, Query and Data recovery process, **DATA DISSEMINATION AND BROADCASTING SYSTEMS:** Communication Asymmetry, Classification of data delivery mechanisms, Broadcast models, Selective tuning and indexing techniques, Digital audio and video broadcasting

**UNIT VI:**

**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. Raj Kamal, "Mobile Computing", Oxford Univ. Press.
2. Asoke K Talukder, et al, "Mobile Computing", Tata McGraw Hill, 2008.

**REFERENCE BOOKS:**

1. Jochen Schiller, "Mobile Communications", Pearson Education, Second Edition, 2008.
2. William Stallings, "Wireless Communications & Networks", Person, 2<sup>nd</sup> Edition, 2007.
3. Ivan Stojmenovic, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2007.
4. Dr. Sunilkumar, et al "Wireless and Mobile Networks: Concepts and Protocols", Wiley India
5. Kumkum Garg, "Mobile Computing", Pearson.

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**APPLICATIONS OF NETWORK SECURITY**

4R213 L T P C  
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**UNIT – I**

**IEEE 802.11 Wireless LAN Security:** Background, Authentication: Pre- WEP Authentication, Authentication in WEP, Authentication and key agreement in 802.11i, Confidentiality and Integrity: Data protection in WEP, Data protection in TKIP and CCMP

**UNIT –II**

**CellPhone Security:** Preliminaries, GSM (2G) Security, Security in UMTS (3G)

**UNIT – III**

**Non-Cryptographic Protocol Vulnerabilities:** DoS and DDoS, Session Hijacking and Spoofing, Pharming Attacks, Wireless LAN Vulnerabilities **Software Vulnerabilities:** Phishing, Buffer Overflow, Format String Attacks, Cross-Site Scripting (XSS), SQL Injection **Access Control in the Operating System:** Preliminaries, Discretionary Access Control – Case Studies: Windows/ Unix , Mandatory Access Control, Role-Based Access Control, SELinux and Recent Trends

**UNIT –IV**

**Intrusion Prevention and Detection:** Introduction, Prevention versus Detection, Types of Intrusion Detection systems, DDoS Attack Prevention/Detection, Malware Defense

**UNIT – V**

**Web Services Security:** Motivation, Technologies for Web Services: XML, SOAP, WSDL and UDDI, SSI, WS-Security, SAML, Ws-Trust, WS-Security Policy

**UNIT – VI**

**Computer and Network Forensics:** Definition, Computer Forensics: History of Computer Forensics, Elements of Computer Forensics, Investigative Procedures, Analysis of Evidence, Network Forensics: Intrusion Analysis, Damage Assessment, Forensic Tools: Computer Forensic tools, Network Forensic Tools

**TEXT BOOKS**

1. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning
2. Computer Network Security: Joseph Migga Kizza, Springerlink

**REFERENCES:**

1. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2<sup>nd</sup> Edition
2. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
3. Wireless Security-Models, Threats, and Solutions: Randall K.Nichols, Panos C.Lekkas, TMH
4. Computer Security: Dieter Gollman, 2<sup>nd</sup> Edition, Wiley India
5. Computer Evidence: Collection & Preservation, Christopher L.T.Brown, Firewall Media

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**WEB TECHNOLOGIES**

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**Unit I: Review of Java Language:**

Java Language basics, Exception Handling, basics of multi-threaded programs, Packages, Java IO package (Input and Output streams, Buffered reader and writer), Util Package (Hashtable, Vector, Arrays, Calendar, Gregorian Calendar, Date)  
Introduction to simple Swing components (JLabel, JButton, JTextField, JTextArea, JPasswordField, JComboBox, JFrame, JPanel, JScrollPane), Layout Managers (Flow, Grid, Border and Box Layout),

**Unit II: Java Applets**

Applet life cycle, Simple Applet Programming with JApplet, Applet vs console programming in Java  
Event Handling, Event Listeners (Mouse, Action, Change and Focus listeners), Event Adapters,  
Introduction to XML, XML Schema validation for simple and complex data types, XML Parsing with DOM and SAX Parsers in Java

**Unit III: Introduction to Web Programming:**

HTML Common tags for text formatting, Lists, Tables, Images, Forms, Frames, Image Maps, Tag Attributes  
Cascading Style sheets, Linking to HTML Pages, Classes in CSS, General CSS statements for Text, Table, List and Page formatting  
Introduction to Java Scripts, variables, arrays, methods and string manipulation, Document Object Model, accessing elements by ID, Objects in Java Script, Dynamic HTML with Java Script (innerHTML and Layers), and with CSS, form validation with Javascript

**Unit IV: Introduction to Java Servlets:**

Introduction to Servlets: Lifecycle of a Servlet, javax.servlet Package, Reading request and initialization parameters, Writing output to response, MIME types in response.  
Session Tracking: Using Cookies, Using Sessions, Security Issues, Simple Session tracking examples  
Web servers: Tomcat Server installation, File Structure, Deployment Descriptor (web.xml), Steps involved in Deploying an application  
Database Access with JDBC, Simple Examples

**Unit V: Introduction to JSP:**

JSP Application Development: Types of JSP Constructs (Directives, Declarations, Expressions, Code Snippets), Generating Dynamic Content, Exception Handling, Debugging  
Using Scripting Elements, Implicit JSP Objects, Conditional Processing, Sharing Data Between JSP pages, Sharing Session and Application Data, Memory requirements considerations, Using user defined classes with jsp:useBean tag, Accessing a Database from a JSP Page Application  
Introduction to Ajax programming with JSP/Servlets, creating XML Http Object for various browsers, simple applications that use GET method

**Unit VI: Introduction to Struts Framework:**

Introduction to MVC architecture, Anatomy of a simple struts application, struts-config.xml file, Presentation layer with JSP, Struts Controller class, JSP bean, html and logic tag libraries, ActionForms, DynaActionForm, Actions, Forwarding, Error Handling, Database Connection Pooling, validation framework and examples for simple data types, Internationalization

**TEXT BOOKS:**

1. Web Programming, building internet applications, Chris Bates 3<sup>rd</sup> edition, WILEY Dreamtech .
2. Java Server Pages,Hans Bergsten, SPD, O'Reilly.

**REFERENCE BOOKS:**

1. Programming the world wide web,4<sup>th</sup> edition,R.W.Sebesta,Pearson
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES , Marty Hall and Larry Brown Pearson
3. Internet and World Wide Web – How to program , Dietel and Nieto PHI/Pearson.
4. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly.
5. Professional Java Server Programming,S.Allamaraju and othersApress(dreamtech).
6. Java Server Programming ,Ivan Bayross and others,The X Team,SPD
7. Web Warrior Guide to Web Programmimg-Bai/Ekedaw-Cengage Learning.
8. Beginning Web Programming-Jon Duckett ,WROX.
9. Java Server Pages, Pekowsky, Pearson.
10. Java Script,D.Flanagan,O'Reilly,SPD.
11. The complete Reference Java 7<sup>th</sup> Edition , Herbert Schildt., TMH.
12. Professional Jakarta Struts - James Goodwill, Richard Hightower, Wrox Publishers.

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**INFORMATION SECURITY MANAGEMENT AND STANDARDS**

4R215

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**UNIT I**

**Information Security Management in Organizations**

Security Policy, Standards, Guidelines and Procedures, Information Security Management System (ISMS), Organizational responsibility for Information Security Management, Information Security Awareness Scenario in Indian Organizations, Building Blocks of Information Security

**UNIT II**

**Risk Management**

Overview of Risk Management, Risk Identification, Risk Assessment, Risk Control, Quantitative and Qualitative Approaches, Introduction to OCTAVE and COBIT approach.

**UNIT III**

Finding Networking vulnerabilities, Firewalls – Processing modes, Categorization, Architectures, Selecting the right firewall, managing the firewalls. Intrusion Detection and Prevention Systems (IDS & IPS), Protecting Remote Connections – Virtual Private Networks for security

**UNIT IV**

Introduction to security audits, need for security audits, organizational roles, Auditor’s roles, Types of security audits, Audit approaches, Technology based audits. Business Continuity and Disaster Recovery Planning.

**UNIT V**

Overview of ISO 17799/ISO 27001 Standards, System Security Engineering Capability Maturity Model (SSE-CMM). NIST Model, VISA International Security Model, Baselineing and Best Business practitioners, Design of Security Architecture.

**UNIT VI**

Legal, Ethical, and professional Issues in Information Security – Law and Ethics in Information Security, Types of Law, Relevant US Laws, International Laws and Legal Bodies, Policy versus Law, Ethics and Information Security, Codes of Ethics and Professional Organizations.

**TEXT BOOKS:**

1. Information Systems Security, *Nina Godbole*, Wiley India, 2009
2. Principles and Practices of Information Security. *Michael E. Whitman, Herbert J. Mattord*, Cengage Learning,



**REFERENCE BOOKS:**

1. Microsoft Security Risk Management Guide
2. Risk Management Guide for Information Technology Systems  
<http://csrc.nist.gov/publications/nistpubs/800-30/sp800-30.pdf>
3. OCTAVE approach  
<http://www.cert.org/octave/>
4. COBIT  
<http://www.isaca.org/>
5. Guide to Firewalls and Policies (Unit 3)  
<http://csrc.nist.gov/publications/nistpubs/800-41/sp800-41.pdf>
6. Firewalls and Network Security, Micheal E. Whitman, et al. Cengage Learning, 2008
7. Audit Trails (Unit 7)  
<http://csrc.nist.gov/publications/nistpubs/800-12/800-12-html/chapter18.html>

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**WEB SECURITY AND ETHICAL HACKING**  
**(Professional Elective--III)**

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**UNIT I**

Introduction – A web security forensic lesson, Web languages, Introduction to different web attacks. Overview of N-tier web applications, Web Servers:Apache, IIS, Database Servers

**UNIT II**

Review of computer security, Public Key cryptography, RSA, Review of Cryptography basics, On-line shipping, Payment Gateways.

**UNIT III**

Web Hacking basics HTTP & HTTPS URL, Web Under the Cover Overview of Java security, Reading the HTML source, Applet security, Servlets security

**UNIT IV**

**Introduction to Ethical Hacking, Ethics, and Legality**

Ethical Hacking Terminology, Different Types of Hacking Technologies, Different Phases Involved in Ethical Hacking and Stages of Ethical Hacking: Passive and Active Reconnaissance, Scanning, Gaining Access, Maintaining Access, Covering Tracks, Hacktivism, Types of Hacker Classes, Skills Required to Become an Ethical Hacker, Vulnerability Research, Ways to Conduct Ethical Hacking, Creating a Security Evaluation Plan, Types of Ethical Hacks, Testing Types, Ethical Hacking Report

**Footprinting and Social Engineering**

Footprinting, Information Gathering Methodology, Competitive Intelligence, DNS Enumeration, Whois and ARIN Lookups, Types of DNS Records, Traceroute, E-Mail Tracking, Web Spiders, Social Engineering, Common Types Of Attacks, Insider Attacks, Identity Theft, Phishing Attacks, Online Scams, URL Obfuscation, Social-Engineering Countermeasures.

**UNIT V**

**Scanning and Enumeration**

Scanning, types of Scanning, CEH Scanning Methodology, Ping Sweep Techniques, Nmap Command Switches, SYN, Stealth, XMAS, NULL, IDLE, and FIN Scans, TCP Communication Flag Types, War-Dialing Techniques, Banner Grabbing and OS Fingerprinting Techniques, Proxy Servers, Anonymizers, HTTP Tunneling Techniques, IP Spoofing Techniques, Enumeration, Null Sessions, SNMP Enumeration, Windows 2000 DNS Zone Transfer, Steps Involved in Performing Enumeration

**System Hacking**

Understanding Password-Cracking Techniques, Understanding the LanManager Hash Cracking Windows 2000 Passwords, Redirecting the SMB Logon to the Attacker SMB Redirection, SMB Relay MITM Attacks and Countermeasures, NetBIOS DoS Attacks, Password-Cracking Countermeasures, Understanding Different Types of Passwords Passive Online Attacks, Active Online Attacks, Offline Attacks Nonelectronic Attacks, Understanding Keyloggers and Other Spyware Technologies

Understand Escalating Privileges, Executing Applications, Buffer Overflows, Understanding Rootkits Planting Rootkits on Windows 2000 and XP Machines, Rootkit Embedded TCP/IP Stack Rootkit Countermeasures, Understanding How to Hide Files, NTFS File Streaming NTFS Stream Countermeasures, Understanding Steganography Technologies, Understanding How to Cover Your Tracks and Erase Evidence, Disabling Auditing, Clearing the Event Log

**UNIT VI**

**Trojans, Backdoors, Viruses, and Worms**

Trojans and Backdoors, Overt and Covert Channels, Types of Trojans, Reverse-Connecting Trojans, Netcat Trojan ,Indications of a Trojan Attack,Wrapping, Trojan Construction Kit and Trojan Makers , Countermeasure Techniques in Preventing Trojans, Trojan-Evading Techniques, System File Verification Subobjective to Trojan Countermeasures Viruses and Worms, Difference between a Virus and a Worm ,Types of Viruses,,Understand Antivirus Evasion Techniques,Understand Virus Detection Methods

### **Sniffers**

Protocols Susceptible to Sniffing, Active and Passive Sniffing,ARP Poisoning, Ethereal Capture and Display Filters,MAC Flooding, DNS Spoofing Techniques,Sniffing Countermeasures

### **Denial of Service and Session Hijacking**

Denial of Service, Types of DoS Attacks, DDoS Attacks ,BOTs/BOTNETs, “Smurf” Attack, “SYN” Flooding ,DoS/DDoS Countermeasures, Session Hijacking, Spoofing vs. Hijacking, Types of Session Hijacking, Sequence Prediction,Steps in Performing Session Hijacking, Prevention of Session Hijacking

### **UNIT IV**

Symmetric and Asymmetric encryptions, Network Security basics, Firewalls & IDS, Digital certificates, Hashing, Message digest, Digital Signatures

### **TEXT BOOKS:**

1. Web Hacking: Attacks and Defense, Stuart McClure, Saumil,Shreeraj Shah, Pearson Education, 2003, rp2007.
2. Web Security, Privacy & Commerce, Simson Garfinkel, SPD, O`Reilly, 2002.

### **REFERENCE BOOKS:**

1. The World Wide Web Security FAQ: <http://www.w3.org/Security/faq/>
2. The OpenSSL project (SDKs for free download): <http://www.openssl.org/>
3. Top 10 Web Vulnerability Scanners <http://sectools.org/web-scanners.html>
- 4.CEH official Certified Ethical Hacking Review Guide, Wiley India Edition
- 5.Certified Ethical Hacker: Michael Gregg, Pearson Education

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**STORAGE AREA NETWORKS**  
**(Professional Elective– III)**

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**Unit I:**  
**Introduction to Storage Technology**

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

**Unit II:**  
**Storage Systems Architecture**

Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components , Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems ,High-level architecture and working of an intelligent storage system

**Unit III:**  
**Introduction to Networked Storage**

Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN , Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfills the need , Understand the appropriateness of the different networked storage options for different application environments

**Unit IV:**  
**Information Availability & Monitoring & Managing Datacenter**

List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) ,RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures , Architecture of backup/recovery and the different backup/recovery topologies , replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities  
Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center

**Unit V:**  
**Securing Storage and Storage Virtualization**

Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes

**Unit VI:**  
**Case Studies**

The technologies described in the course are reinforced with EMC examples of actual solutions. Realistic case studies enable the participant to design the most appropriate solution for given sets of criteria.

**TEXT BOOKS :**

1. EMC Corporation, Information Storage and Management, Wiley.
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill , Osborne, 2003.
3. Marc Farley, "Building Storage Networks", Tata McGraw Hill ,Osborne, 2001.
4. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002.

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**MOBILE APPLICATION DEVELOPMENT**  
(Professional Elective– III)

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**Unit I**

**J2ME Overview**

Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices

*Small Computing Technology:* Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants

**Unit II**

**J2ME Architecture and Development Environment**

J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit

*J2ME Best Practices and Patterns:* The Reality of Working in a J2ME World, Best Practices

**Unit III**

**Commands, Items, and Event Processing**

J2ME User Interfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling

*High-Level Display: Screens:* Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class

*Low-Level Display: Canvas:* The Canvas, User Interactions, Graphics, Clipping Regions, Animation

**Unit IV**

**Record Management System-I**

Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener

*JDBC Objects:* The Concept of JDBC, JDBC Driver Types, JDBC Packages, Overview of the JDBC Process, Database Connection, statement Objects, Result set, Transaction Processing, Metadata, Data Types, Exceptions

**Unit V**

**Record Management System-II**

*JDBC and Embedded SQL:* Model Programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Metadata, Updating Tables, Deleting Data from a Table, Joining Tables, Calculating Data, Grouping and Ordering Data, Subqueries, VIEWS

**Unit VI**

**Generic Connection Framework**

The Connection, Hypertext Transfer Protocol, Communication Management Using HTTP Commands, Session Management, Transmit as a Background Process

**TEXT BOOKS:**

- 1.J2ME: The Complete Reference, James Keogh, Tata McGrawHill.

**REFERENCE BOOKS:**

1. Enterprise J2ME: Developing Mobile Java Applications – Michael Juntao Yuan, Pearson Education, 2004
2. Beginning Java ME Platform, Ray Rischpater, Apress, 2009
3. Beginning J2ME: From Novice to Professional, Third Edition, Sing Li, Jonathan B. Knudsen, Apress, 2005
4. Kicking Butt with MIDP and MSA: Creating Great Mobile Applications, 1<sup>st</sup> edition, J. Knudsen, Pearson.

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**CLOUD COMPUTING**  
**(Professional Elective– III)**

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**UNIT - I**

Introductory Concepts & overview: Distributed Systems - Parallel Computing Architectures: Vector Processing, Symmetric Multi Processing and Massively parallel processing systems - High Performance Computing - Grid Computing - Service Oriented Architecture Overview - Virtualization.

**UNIT - II**

Overview of Cloud Computing : Meaning of the terms Cloud and cloud computing - cloud based service offerings - Grid Computing Vs Cloud Computing - Benefits of Cloud Model - limitations - legal issues - key characteristics of cloud computing - challenges for the cloud - the evolution of cloud computing.

**UNIT - III**

Web services delivered from the cloud: Infrastructure as a service - platform as a service - software as a service. Building Cloud networks: Evolution from the MSP model to cloud computing and software as a service - the cloud data center - SOA as step toward cloud computing - basic approach to a data center based SOA.

**UNIT - IV**

Federation Presence, Identity & Privacy in the Cloud: Federation in the cloud - presence in the cloud - privacy in the cloud - Privacy and its relation to cloud based information system. security in the cloud: cloud security challenges - software as a service security.

**UNIT - V**

Common Standards in cloud computing: the open cloud consortium - the distributed management task force - standards for application developers -standards for messaging - standards for security.

**UNIT - VI**

Mobile internet devices and the cloud: smartphone - mobile operating systems for smartphones - mobile platform virtualization - Collaboration Applications for mobile platforms - future trends. Casestudies: Map Reduce, HDFS.

**TEXT BOOKS:**

1. Cloud Computing Implementation, Management and Security by John W. Rittinghouse, James F. Ransome, CRC Press, Taylor & Francis group, 2010.
2. Cloud Computing a practical approach by Anthony T. Velte, Toby J. velte Robert Elsenpeter, Tata McGrawHill edition, 2010.

**REFERENCES:**

1. Cloud Application Architectures by George Reese, O'Reilly publishers.
2. Cloud Computing and SOA convergence in your enterprise, David S. Linthicum, Addison- Wesley.
3. George Coulouris, JeanDollimore and Tim Kindberg. Distributed Systems:Concepts and Design (Edition 3 ).Addison-Wesley2001 .

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**WIRELESS SECURITY**  
**(Professional Elective-III)**

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**UNIT – I**

**Traditional Security Issues:** Integrity, Confidentiality, Nonrepudiation, Availability, Mobile and Wireless Security Issues: detectability, Resource Depletion/Exhaustion, physical Intercept Problems, Theft of Service, War Driving/Walking/Chalking, Mobility, Problems in Adhoc Networks: Routing, Prekeying, Reconfiguring, Hostile Environment

Additional Issues: Commerce – liability, Fear, Uncertainty, Doubt, Fraud, Big Bucks at Stake

**UNIT – II**

**Approaches to Security;** Limit the Signal, Wire Integrity and Tapping, Physical Limitation, Encryption, Public and Private key Encryption, Computational and Data Overhead, Integrity Codes, Checksum, Hash, MAC, Payload vs Header, Traffic Analysis

**IPSec,** Authentication Header(AH), Encapsulating Security Payload(ESP), Other Security-Related Mechanisms, Authentication Protocols, AAA, Special Hardware

**UNIT – III**

**Security in Wireless Personal Area Networks,** Basic Idea, Bluetooth (Specifications, Network Terms, Security Mechanisms) , Bluetooth Security Modes, Bluetooth Security Mechanisms, Initialization Key, Unit Key, Combination Key, Master Key, Encryption, Authentication, Limitations and Problems

**UNIT – IV**

**Security in Wireless Local Area Networks,** Wireless Alphabet Soup, Wired Equivalent Privacy(WEP) – goals, data frame, encryption, decryption, authentication, flaws, fixes

**Wi-Fi Protected Access(WPA), IEEE 802.11i,** Encryption Protocols, Access Control via 802.1x, Fixes and “Best Practices”, Anything is Better than Nothing, Know Thine Enemy, Use Whatever Wireless Security Mechanisms are Present, End – To – End VPN, Firewall Protection

**UNIT – V**

**Broadband Wireless Access, IEEE 802.16,** IEEE 802.16 Security, Key Management, Security Associations, Keying Material Lifetime, Subscriber Station(SS) Authorization, Encryption, problems and limitations

**UNIT – VI**

**Security in Wide Area Networks,** basic idea, CDMA, GSM, GSM Authentication, GSM Encryption, Problems with GSM Security, Session Life, Weak Encryption Algorithm, Encryption Between Mobile Host and Base Station Only, Limits to the Secret Key

**TEXT BOOKS:**

1. Fundamentals of Mobile and Pervasive Computing, Frank Adelstein, K.S.Gupta et al, TMH 2005.

**REFERENCES:**

1. Wireless Security Models, Threats and Solutions, Randall k. Nichols, Panos C. Lekkas, TMH, 2006.
2. 802.11 Security, Bruce Potter & Bob Fleck, SPD O'REILLY 2005.
3. Guide to Wireless Network Security, Springer.

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**ENTREPRENEURSHIP AND INNOVATION**  
**(Open Elective)**

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**Course Objective:** The objective of the course is to make students understand the nature of entrepreneurship, and to motivate the student to start his/her own enterprise with innovative skills.

**UNIT I**

**NATURE OF ENTREPRENEURSHIP:** Characteristics, Qualities and skills of an Entrepreneur, functions of entrepreneur, Entrepreneur scenario in India and Abroad. Forms of Entrepreneurship: Small Business, Importance in Indian Economy, Types of ownership, sole trading, partnership, Joint Stock Company and other forms. First-Mover disadvantages, Risk Reduction strategies, Market scope strategy, Imitation strategies, and Managing Newness.

**UNIT II**

**ASPECTS OF PROMOTION:** Generation of new entry opportunity, SWOT Analysis, Technological Competitiveness, legal regulatory systems, patents and trademarks, Intellectual Property Rights- Project Planning and Feasibility Studies- Major steps in product development.

**UNIT III**

**MANAGEMENT OF SMALL BUSINESS:** Pre feasibility study - Ownership - budgeting –project profile preparation - Feasibility Report preparation - Evaluation Criteria- Market and channel selection- Product launching - Monitoring and Evaluation of Business- Effective Management of Small business.

**UNIT IV**

**SUPPORT SYSTEMS FOR ENTREPRENEURS:** Institutional Support, Training institution, Financial Institutions and Aspects: Sources of raising Capital, Debt-Equity, Financing by Commercial Banks, Government Grants and Subsidies, Entrepreneurship Promotion Schemes of Department of Industries (DIC), KVIC, SIDBI, NABARD, NSIC, APSFC, IFCI and IDBI. New Financial Instruments. Research and Development – Marketing and legal aspects, Taxation benefits, Global aspects of Entrepreneurship.

**UNIT V**

**INTRODUCTION TO INNOVATION:** Meaning of innovation, sources of innovative opportunity, 7 sources of innovative opportunity, Principles of innovation, the enablers of innovation, business insights, insights for innovation, technical architecture for innovation, focus on the essence of innovation.

**UNIT VI**

**PROCESS AND STRATEGIES FOR INNOVATION:** Process of innovation, the need for a conceptual approach, Factors contributing to successful technological innovation, Strategies that aim at innovation, impediments to value creation and innovation.

**Books Recommended:**

- Robert D Hisrich, Michael P Peters, Dean A Shepherd: Entrepreneurship, TMH, 2009
- Peter Drucker (1993), “Innovation and Entrepreneurship”, Hyper Business Book.

**References:**

- Bholanath Dutta: Entrepreneurship – Text and cases, Excel, 2009.

- Vasanth Desai: Entrepreneurship, HPH, 2009
- Barringer: Entrepreneurship, Pearson, 2009.
- C.K. Prahalad, M.S. Krishnan, The new age of Innovation – TATA McGRAW-HILL Edition 2008
- H. Nandan: Fundamentals of Entrepreneurship, PHI, 2009.
- Stay Hungry Stay Foolish, Rashmi Bansal and published by IIM., Ahmedabad

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**BANKING, INSURANCE AND RISK MANAGEMENT**  
**(Open Elective)**

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**Course Objective:** The objective of the course is to provide to students an understanding of Banking Operations, Insurance Market, and Risk Management Principles and techniques to control the risk, & the major Institutions involved and the Services offered within this framework.

**UNIT I**

**INTRODUCTION TO BANKING BUSINESS:** Introduction to Banking sectors-History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank New Dimensions and products- E-Banking, Mobile-Banking, Net Banking, CRM, cheque system and KYC system.

**UNIT II**

**BANKING REFORMS AND REGULATIONS:** Banking regulation Act-1949, Reserve Bank of India Act-1934, Establishment of RBI, Functions and credit control system; Role of commercial banks and its functions. Banking sector reforms in India and deficiencies in Indian banking including problems accounts and Non-Performing Assets.

**UNIT III**

**INTRODUCTION TO INSURANCE:** Introduction to insurance, Need and importance of Insurance, principles of Insurance, characteristics of insurance contract, branches of insurance and types of insurance; life insurance and its products: Role of Agents and brokers.

**UNIT IV**

**INSURANCE BUSINESS ENVIRONMENT:** Regulatory and legal frame work governing the insurance sector, history of IRDA and its functions: Business and economics of insurance, need for changing mindset and latest trends.

**UNIT V**

**INTRODUCTION TO RISK MANAGEMENT:** Introduction to Risk, meaning and types of risk in business and individual, Risk management process, methods: Risk identification and measurement, Risk management techniques; Non insurance methods.

**UNIT VI**

**FINANCIAL RISK MANAGEMENT:** Introduction to Financial markets. Financial risk management techniques –Derivatives, Hedging and Portfolio management techniques: Derivatives and types of Derivatives-Futures, options and swaps: Shares, Commodity and Currency trading in India.

**Books Recommended:**

- Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
- General Principles of Insurance Harding and Evantly
- Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.

**References:**

- Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
- Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
- G. Koteswar: Risk Management Insurance and Derivatives, Himalaya, 2008.

- Gulati: Principles of Insurance Management, Excel, 2009.
- James S Trieschmann, Robert E. Hoyt & David N. Sommer: Risk Mgt. & Insurance, Cengage, 2009.
- Dorfman: Introduction to Risk Management and Insurance, 8/e, Pearson, 2009.
- P.K. Gupta: Insurance and Risk Management, Himalaya, 2009.
- Vivek & P.N. Asthana: Financial Risk Management, Himalaya, 2009.
- Jyotsna Sethi & Nishwan Bhatia : Elements of Banking and Insurance, 2/e, PHI, 2012.

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**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**INTELLECTUAL PROPERTY RIGHTS, VALUES AND ETHICS**  
**(Open Elective)**

**4GC33** **L T P C**  
**3 1 - 3**

**UNIT –I: INTELLECTUAL PROPERTY RIGHTS - I**

Invention and Creativity, Basic Types of Property, Need for Protection of IPR, Patents, Criteria for Patentability, Overview of Patent search, drafting and filing,

**UNIT II: INTELLECTUAL PROPERTY RIGHTS - II**

Trade Marks, Trade Secrets, Industrial Designs, Integrated Circuits, Geographical Indications, Copyrights.

**UNIT-III: CONVENTIONS AND TREATIES:**

WTO, GATT & TRIPS, WIPO Mission and Activities, Patent Cooperation Treaty, Case Studies on IP

**UNIT-IV: CULTURE & VALUES:**

A Introduction to Indian Culture Values and Ethics, The Indian Concept of Human Life, Indian Civilization, Sanskrit and Indian Languages, Festivals, Sculpture, Music, Dance, Drama, Ayurveda. Family and its Importance, Indian Marriage System, Status of Women in Indian Society, Education, Purpose, Ancient System, Value Education, Human Value System, Interfaith Understanding, Happiness, Modernism and its Effect on Lifestyle, Mind and its Operation, Control of Mind, Yoga, Control of Sense organs, Exemplary Life Sketches-Albert Einstein, M K Gandhi, Abdul Kalam

**UNIT-V: ETHICS:**

Ethics in Ancient India, Ethics, Morals, Ethics and Human Life, Core Areas for Ethics, Values, Morality, Integrity, Honesty, Character, Loyalty, Trustworthiness, Courage and Confidence, Confidentiality, Secrecy and Transparency, Justification, Contracts and Spirit Promises and Schedules, Quarrels, Selfishness, Obstacles, Supporting Measures, Reputation and its sale, Decision Making in Ethics, Exemplary Life Sketches-Vishveshwaraiyah, Jagadeesh Chandra Bose, Meghanad Saha

**UNIT- VI: PROFESSIONAL ETHICS:**

Occupation, Profession, Professional, Professional Organization, Obligations of a Professional, Temptations, Aptitude, Importance of Professional Ethics for Engineers, Code of Ethics, Need for a Code, Impact of Ethical Behaviour, The Code of Ethics for Engineers, Fundamental Principles and Cannons, Commerce and Ethics, Marketing Ethics, Finance and Ethics, Science, Religion and Ethics, Medical Ethics, Genetics and Ethics, Politics and Ethics, Genders and Ethics, Media and Ethics, Computer Ethics Exemplary Life Sketches- Narayan Murthy, Homi Jahangir Bhabha

**REFERENCES:**

1. Anitha Rao R & Bhanoji Rao “Intellectual Property Rights – A Primer”, Eastern Book Co, 2008.
2. **The ABCs of Ethics by Michael. L. Buckner, Universe. Inc, New York Lincoln, Shanghai**
3. **Science, Faith and Ethics by Denis Alexander and Robert.S.White, Hendrickson Publishers, Massachusetts, USA, March 2006**
4. **Vedic Science Primer by PSR Murthy, BS Publications, Hyderabad**
5. **Medical Ethics-Global View Points, Edited by Diane Andrews, Hennig Feld, Green Haven Press**
6. Divine Stories, Human Value Stories, Volume I and II, Sri Satya Sai Books and Publications

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**M.Tech I year II semester**  
**Computer networks and information security**  
**WEB TECHNOLOGIES AND NETWORK SECURITY LAB**

4R273

L      T      P      C  
-      -      4      2

**List of Sample Problems:**

**i)Web Technologies**

1. Develop static pages (using Only HTML) of an online Book store. The pages should resemble: [www.amazon.com](http://www.amazon.com) The website should consist the following pages.

- Home page, Registration and user Login
- User Profile Page, Books catalog
- Shopping Cart, Payment By credit card
- Order Conformation

2. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

3. Create and save an XML document at the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.

\*4. Bean Assignments

- a. Create a JavaBean which gives the exchange value of INR(Indian Rupees) into equivalent American/Canadian/Australian Dollar value.
- b. Create a simple Bean with a label - which is the count of number of clicks. Than create a BeanInfo class such that only the “count” property is visible in the Property Window.
- c. Create two Beans-a)KeyPad .b)DisplayPad .After that integrate the two Beans to make it work as a Calculator.
- d. Create two Beans Traffic Light(Implemented as a Label with only three background colours-Red,Green,Yellow) and Automobile(Implemented as a TextBox which states its state/movement). The state of the Automobile should depend on the following Light Transition Table.

Light Transition	Automobile State
Red ---> Yellow	Ready
Yellow ---> Green	Move
Green --> Red	Stopped

5. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using Servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

6. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

7. Implement the “Hello World!” program using JSP Struts Framework.



## ii)Java Programming

1. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, \*, % operations. Add a text field to display the result.
  
2.
  - a) Develop an applet in Java that displays a simple message.
  - b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.
  
3. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.
  
4. Write a Java program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle, and the result produced by the server is the area of the circle. (Use java.net)
  
5.
  - a) Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time.No light is on when the program starts.
  - b) Write a Java program that allows the user to draw lines, rectangles and ovals.
  
6.
  - a) Write a Java program to create an abstract class named Shape that contains an empty method named numberOfSides ( ).Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides ( ) that shows the number of sides in the given geometrical figures.
  
  - b) Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Jtable component.

7. Write a Java program for handling Key events.
8. Write a Java program for handling mouse events. (Use Adapter classes).

**List of Sample Problems:**

1. Write a C program that contains a string(char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and display the result.
2. Write a C program that contains a string(char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
  - a. Ceaser cipher
  - b. Substitution cipher
  - c. Hill Cipher
4. Write a C program to implement the DES algorithm logic.
5. Write a JAVA program to implement the DES algorithm logic.
6. Write a Java program that contains functions, which accept a key and input text to be encrypted/decrypted. This program should use the key to encrypt/decrypt the input by using the triple Des algorithm. Make use of Java Cryptography package.
7. Write a C/JAVA program to implement the Blowfish algorithm logic.
8. Write a C/JAVA program to implement the Rijndael algorithm logic.
9. Write the RC4 logic in Java
10. Using Java cryptography, encrypt the text "Hello world" using Blowfish. Create your own key using Java keytool.
11. Implement DES-2 and DES-3 using Java cryptography package.
12. Write a Java program to implement RSA algorithm.
13. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties(Alice) and the JavaScript application as the other party(Bob)
14. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
15. Calculate the message digest of a text using the MD5 algorithm in JAVA.
16. Explore the Java classes related to digital certificates.
17. Create a digital certificate of your own by using the Java keytool.
18. Write a Java program to encrypt users passwords before they are stored in a database table, and to retrieve them whenever they are to be brought back for verification.
19. Key generation(public and private key pair) can be performed using Java. Write a program which can do this.
20. Write a program in java, which performs a digital signature on a given text.

**Reference Books:**

1. Java Server Programming for Professionals, 2nd Edition, Bayross and others, O'reilly,SPD, 2007.
2. JDBC, Servlets, and JSP ,Black Book, K. Santosh Kumar, dreamtech.
3. Core Web Programming, 2nd Edition, Volume 1, M.Hall and L.Brown, PHPTR.
4. Core Web Programming, 2nd Edition, Volume 2, M.Hall and L.Brown, PHPTR.
5. Core Java, Volume 1, Horstman and Cornell, 8th Edition, Pearson Education, 2008.
6. Core Java, Volume 2, Horstman and Cornell, 8th Edition, Pearson Education, 2008.
7. Java Programming: Advanced Topics, 3rd Edition, J.Wiggles worth and P.McMillan,Cengage Learning, 2007.

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>	<b>m</b>
					<b>x</b>	<b>x</b>	<b>x</b>		<b>x</b>			

**M.Tech I year II semester**  
**Computer Networks and Information Security**  
**TECHNICAL SEMINAR**  
**(Independent Review Paper)**

4R274

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	3	2

**Max. Marks: 50**

There shall be two seminar presentations during I year I semester and I year II Semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee, which shall consist of the Head of the Department, a senior Faculty Member and the Supervisor and will jointly evaluate the report and presentation. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful.

In the First semester the report must be in the form of the review paper with a format used by IEEE / ASME etc. In the Second semester Technical Seminar in the form of Independent Review Paper must be of high quality fit for publication in a reputed conference / journal.

**The evaluation format for seminar is as follows:**

- Day to day evaluation by the Supervisor : 10 marks
- Final Report : 10 marks
- Presentation : 30 marks

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>	<b>m</b>
<b>x</b>		<b>x</b>				<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>			

**M.Tech II year I semester**  
**Computer Networks and Information Security**  
**COMPREHENSIVE VIVA-VOCE**

4R375

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	-	2

**Max. Marks: 50**

There shall be a Comprehensive Viva-Voce in II year I Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he/she studied during the M.Tech course of study. The Comprehensive Viva-Voce is valued for 50 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce. A candidate has to secure a minimum of 50% to be declared successful.

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>	<b>m</b>
					<b>x</b>	<b>x</b>	<b>x</b>		<b>x</b>			

**M.Tech II year I semester**  
**Computer Networks and Information Security**  
**PROJECT SEMINAR-1**

**4R376**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	-	2

**Max. Marks: 50**

In II year I semester and II semester, a project seminar shall be conducted for 50 marks and for 2 credits (there is no external evaluation) in each of the semester. The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 25 marks and the end semester seminar evaluation shall carry 25 marks. The report for the project seminar will carry 10 marks and the remaining marks (15) shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>	<b>m</b>
					<b>x</b>	<b>x</b>						

**M.Tech II year I semester**  
**Computer Networks and Information Security**  
**PROJECT WORK (PART – I)**

**4R377**

**L        T        P        C**  
**-        -        -        18**

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Project Review Committee.

A Project Review Committee (PRC) shall be constituted comprising of Heads of all the Departments which are offering the M.Tech programs and three other senior faculty members concerned with the M.Tech. Program.

Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the previous semesters and after obtaining the approval of the PRC.

After satisfying attendance requirement, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the PRC for its approval. Only after obtaining the approval of PRC the student can initiate the Project work. This process is to be completed within four weeks of commencement of II year I semester.

The student shall submit a project report at the end of II year I semester, and the same shall be evaluated at the end of that semester by the PRC as Excellent/Good/Satisfactory/Unsatisfactory. In the case of unsatisfactory declaration, the student shall re-submit the Project report after carrying out the necessary modifications / additions in the Project work, within the specified time as suggested by the PRC.

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>	<b>m</b>
					<b>x</b>	<b>x</b>	<b>x</b>		<b>x</b>			

**M.Tech II year II semester**  
**Computer Networks and Information Security**  
**PROJECT SEMINAR-2**

**4R478**

**L**      **T**      **P**      **C**  
-      -      -      2

In II year I semester and II semester, a project seminar shall be conducted for 50 marks and for 2 credits (there is no external evaluation) in each of the semester. The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 25 marks and the end semester seminar evaluation shall carry 25 marks. The report for the project seminar will carry 10 marks and the remaining marks (15) shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

a	b	c	d	e	f	g	h	i	j	k	l	m
					x	x						

**M.Tech II year II semester**  
**Computer Networks and Information Security**  
**PROJECT WORK AND DISSERTATION**

4R479

L      T      P      C  
-      -      -      20

A candidate is permitted to submit Project Dissertation only after successful completion of PG subjects (theory and practical), seminars, Comprehensive viva-voce, PG Project Part-I, and after the approval of PRC, not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Head of the Department and shall make an oral presentation before the PRC. Along with the draft thesis the candidate shall submit draft copy of a paper in standard format fit for publication in Journal / Conference, based on the project thesis, to the Head of the Department with due recommendation of the supervisor.

- Four copies of the Project Dissertation certified by the Supervisor and Head of the Department shall be submitted to the College.
- The dissertation shall be adjudicated by one examiner selected by the College. For this, Head of Department shall submit a panel of 3 examiners, who are eminent in that field, with the help of the PRC. The Chief Superintendent of the college in consultation with the college academic committee shall nominate the examiner.
- If the report of the examiner is not favourable, the candidate shall revise and resubmit the Dissertation, in the time frame as prescribed by PRC. If the report of the examiner is unfavourable again, the thesis shall be summarily rejected. The candidate can re-register only once for conduct of project and evaluation of Dissertation, and will go through the entire process as mentioned above. The total duration for the M.Tech program is limited to four years.
- If the report of the examiner is favourable, viva-voce examination shall be conducted by a Board consisting of the Head of the Department, Supervisor and the Examiner who adjudicated the Dissertation. The Board shall jointly report the student's performance in the project work as – (a) Excellent, or (b) Good, or (c) Satisfactory, or (d) Unsatisfactory, as the case may be. In case, the student fails in the viva-voce examination, or gets the Unsatisfactory grade, he can re-appear only once for the viva-voce examination, as per the recommendations of the Board. If he fails at the second viva-voce examination, the candidate can re-register only once for conduct of project and evaluation of Dissertation, and will go through the entire process as mentioned above. The total duration for the M.Tech program is limited to four years.