

COURSE STRUCTURE AND DETAILED SYLLABUS

for

M.Tech

in

COMPUTER NETWORKS & INFORMATION SECURITY

(CN & IS)

(Applicable from the Academic Year 2017-2018)



Department of Information Technology (IT)

SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

(An Autonomous Institution approved by UGC and affiliated to JNTUH)

(Accredited by NAAC with 'A' Grade, Accredited by NBA of AICTE, Recipient of WBA under TEQIP I & II)

Yamnampet, Ghatkesar, Malkagiri(Medchal)-501 301

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-2017

I Year - I Semester

Code	Subject	L	T	P	C	Max. Marks		Total
						Internal	External	
6R101	Data Structures and Algorithms	3	1	-	3	25	75	100
6R102	Advanced JAVA Programming	3	1	-	3	25	75	100
6R103	Advanced Computer Networks	3	1	-	3	25	75	100
6R104	Principles of Information Security	3	1	-	3	25	75	100
	Professional Elective – I	3	1	-	3	25	75	100
	Professional Elective – II	3	1	-	3	25	75	100
6P115	Research Methodology	2	-	-	2	25	75	100
6R171	JAVA Programming Lab	-	-	4	2	25	75	100
6R172	Literature Review and Seminar – I	-	-	3	1	100	--	100
6R173	Comprehensive Viva Voce - I	-	-	-	1	50	50	100
	Total Credits	20	06	07	24	350	650	1000

Professional Elective – I		Professional Elective – II	
Code	Subject	Code	Subject
6R105	Network Programming	6R109	Distributed Systems
6R106	Data Warehousing and Data Mining	6R110	Information Retrieval Systems
6R107	Web Services and Service Oriented Architecture	6R111	Semantic Web and Social Networks
6R108	Computer Forensics	6R112	Database Security

I Year - II Semester

Code	Subject	L	T	P	C	Max. Marks		Total
						Internal	External	
6R201	Wireless Networks and Mobile Computing	3	1	-	3	25	75	100
6R202	Network Security	3	1	-	3	25	75	100
6R203	Adhoc and Sensor networks	3	1	-	3	25	75	100
6R204	Information Security, Management and Standards	3	1	-	3	25	75	100
	Professional Elective – III	3	1	-	3	25	75	100
	Open Elective	3	1	-	3	25	75	100
6R271	Information Security through JAVA Lab	-	-	4	2	25	75	100
6R272	Literature Review & Seminar - II	-	-	3	1	100	--	100
6R273	Comprehensive Viva Voce - II	-	-	-	1	50	50	100
6R274	Project Seminar	-	-	3	2	100	---	100
	Total Credits	18	6	10	24	425	575	1000

Professional Elective – III		Open Elective	
Code	Subject	Code	Subject
6R205	Web Security and Ethical Hacking	6ZC13	Entrepreneurship and Innovation
6R206	Cloud Computing	6ZC03	Banking, Operations, Insurance and Risk Management
6R207	Wireless Security	6QC33	Intellectual Property Rights
6R208	Big Data Analytics	6T217	Embedded Systems
6QC47	Bio Informatics	6H233	Ethics, Morals, Gender Sensitization and Yoga

II Year – I Semester

Code	Subject	L	P	Credits	Max. Marks		Total
					CIE	SEE	
6R371	Project work Review I	-	-	12	100	---	100
	Total Credits	-	-	12	100	--	100

II Year – II Semester

Code	Subject	L	P	C	Max. Marks		Total
					CIE	SEE	
6R471	Project work Review II	-	-	12	100	--	100
6R472	Project Evaluation (Viva Voce)	-	-	24	--	200	200
	Total Credits	-	-	36	--	200	300

PEOs AND POs OF M. TECH (Computer Networks and Information Security)

PROGRAMME EDUCATIONAL OUTCOMES (PEOs)

PEO- I: Analyze, design and develop software to carryout research on scientific and multidisciplinary engineering areas, by publishing technical papers.

PEO-II: Pursue a successful career in academia with master's degree in Computer Networks and Information Security having in depth knowledge by using modern engineering techniques and tools for sustainable development through lifelong learning.

PEO-III: Will be able to practice professional ethics, financial aspects along with awareness of information security, legal aspects, gender sensitization, environmental and social needs for carrying project works.

PROGRAMME OUTCOMES (POs)

PO1: Develops an ability to Describe and analyze the hardware, software components of a network and their interrelations. Compare Network protocol models and select appropriate protocols for a particular design.

PO2: Develops an ability to effectively communicate technical information verbally, in writing, and in presentations

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program with an understanding of confidentiality, availability and integrity in Information Technology and Analyze these factors in an existing system and design implementations

PO4: Apply modern engineering techniques, resources and IT tools available in Information Technology to solve complex engineering problems by using appropriate resources to stay abreast of the latest industry tools and techniques analyzing the impact on existing systems and applying to future situations and demonstrate the knowledge for sustainable development through lifelong learning.

PO5: Develop solutions for networking and security problems, balancing business concerns, technical issues and security. Cite and comply with relevant industry and organizational codes of conduct and ethics and become a complete professional with high awareness of information security, and excellent professional with empathy towards the environmental and social needs.

PO6: An ability to independently carry out research /investigation and development work to solve practical problems multi disciplinary areas. .

PO/PEO	1	2	3	4	5	6
I	✓	✓				✓
II			✓	✓		
III					✓	✓

PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
✓		✓	✓	✓	✓

M.Tech I Year I Semester
Computer Networks and Information Security
DATA STRUCTURES AND ALGORITHMS

6R101

L	T	P	C
3	1	-	3

Course Objectives:

To impart the basic concepts of data structures and algorithms and understand concepts about searching and sorting techniques, basic concepts about stacks, queues, lists, trees and graphs. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

Course Outcomes:

1. Choose the data structures that effectively model the information in a problem and be able to Judge efficiency trade-offs among alternative data structure implementations or combinations.
2. Apply algorithm analysis techniques to evaluate the performance of an algorithm and to compare data structures and be able Implement and know when to apply standard algorithms for searching and sorting.
3. Recognize and apply design patterns, and make judgments about when a particular pattern will improve a design.
5. Design, implement, test, and debug programs using a variety of data structures including buffer pools, hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and B-trees.
6. Select appropriate methods for organizing data files and implement file-based data structures. Apply object-oriented design principles to data structures in medium-scale software systems. Apply design guidelines to evaluate alternative software designs.

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.

Unit VI

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.

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.
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REFERENCE BOOKS:

1. Data Structures , Algorithms and Applications in Java,2nd edition,S.Sahani, Universities Press.
 2. Data Structures and algorithms in Java, 3rd edition, Adam Drozdek, Cengage Learning.
 3. Data structures and algorithms in Java,3rd 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,3rd 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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PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
✓		✓	✓		✓

M.Tech I year II semester
Computer Networks and Information Security
Advanced JAVA Programming

6R102 **L T P C**
3 1 - 3

Course Objective: To provide the ability to design console based, GUI based and web based applications. Students will also be able to understand integrated development environment to create, debug and run multi-tier and enterprise-level applications.

Course Outcomes:

- Write programs based upon java concepts.
- Generate an application based upon the concepts of java & advance java.
- Understand, analyze and apply the role languages like HTML, CSS, XML, JavaScript and protocols in the workings of web and web applications.
- Understand about network and security programming using Java .
- To understand the application of dynamic page functionality in web pages using CGI, Servlets, JSP, ASP.
 - Create and communicate between client and server using Java and create a good, effective and dynamic website.
- Create a static website using HTML and add dynamic functionality to it by using java Script.
- Implement the advanced concepts of java such as servelets & jsp to create dynamic web pages & add functionality to the WebPages by using XML.

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 frame work and examples for simple data types, Internationalization

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Programming the world wide web,4th 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 7th Edition , Herbert Schildt., TMH.
 12. Professional Jakarta Struts - James Goodwill, Richard Hightower, Wrox Publishers.
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PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
✓		✓		✓	✓

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

6P103

L T P C
3 1 - 3

Course Objective: This course aims to provide advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks.

Course Outcomes:

- **To master networking and Internet concepts and be familiar with OSI Model and TCP/IP model.**
- **To be able to detect networking errors, learn correction techniques**
- **To explain the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.**
- **To understand Internet addressing IPv4 and IPv6 and Internet protocols**
- **To understand wireless networking and to Develop new protocols in networking**
- **Will be able to build new virtual private networks**

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: 6-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 6) 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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PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
✓	✓		✓		✓

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

6R104

L T P C
3 1 - 3

Course Objective: This course is aimed at giving basic understanding about system security which covers a broad spectrum of security topics and is based on real-life examples to create system security interest in the students. A balanced mix of technical and managerial issues makes this course appealing to attendees who need to understand the salient facets of information security basics and the basics of risk management. 2.

Course Outcomes:

- At the end of the course, the students have firm understanding on basic terminology and concepts related to network and system level security,
- basics of computers and networking including Internet Protocol, routing, Domain Name Service, and network devices.
- They are also exposed to basic cryptography, security management, and network security techniques.
- They also look at policies as a tool to effectively change an organization's culture towards a better secure environment.
- Students will be able to understand the importance of security at different layers of SSL, TLS, SET and PGP
- In the end, the students put it all together in the form of a case study for designing and auditing a security system at conceptual level.

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, MD6, SHA - 612, **Key Management:** Introduction, Digital certificates and types, X.609, 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, 2nd Edition
2. Cryptography and Network Security : William Stallings, Pearson Education, 4th Edition

REFERENCE BOOKS:

1. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning
 2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2nd 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, 1st Edition.
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PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
✓		✓	✓		✓

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

(Professional Elective-I)

6R105

L T P C
3 1 - 3

Course Objectives: To understand the use of client/server architecture in application development and to understand and use elementary socket system calls, advanced socket system calls and Java Socket API. To understand how to use TCP and UDP based sockets. To implement network routing algorithms, application layer protocols and encryption algorithms

Course Outcomes:

- Will be able to discuss network programming with Java in general, including some of the history and features that Java brings to network programming.
- Will be able to type, compile, and execute example Java programs from the textbook that demonstrate key concepts of network programming.
- Able to modify example programs to further demonstrate key concepts of network programming.
- Student can create original programs in Java that demonstrate key concepts of network programming.
- Can create Java network programs that fulfill specific deliverables and provide significant network capability as required to fulfill assignment objectives and deliverables.
- Student will be able to articulate design decisions and create a diary describing learning experiences. This is an essential component of the course project.

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,3rd 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, 2nd Edition, W.R.Stevens, Pearson Education.
3. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.
4. Beginning Linux Programming, 4th 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,3rd 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 7th Edition , Herbert Schildt, TMH.(Part of Unit I)

PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
	✓	✓		✓	✓

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

6R106

L	T	P	C
3	1		3

Course Objective: This course is designed to expand students' knowledge and skills gained in database management courses and look in depth at data warehousing and data mining methods. The course examines the database architecture and technologies required for solving complex problems of data and information management, information retrieval, and knowledge discovery facing modern organizations.

Course Outcomes:

- To introduce students to the basic concepts and techniques of Data Mining
- To develop skills of using recent data mining software for solving practical problems.
- To gain experience of doing independent study and research by learning Data Cube Computation.
- To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems
- Develop and apply critical thinking, problem-solving, and decision-making skills.
- Develop and apply enthusiasm for learning. Class participation is encouraged in this course. Enriching

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, 2nd 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, 2006.
 6. Data Mining Introductory and advanced topics –Margaret H Dunham, Pearson education
 7. Data Mining Techniques – Arun K Pujari, 2nd 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
WEB SERVICES AND SERVICE ORIENTED ARCHITECTURE
(Professional Elective-I)

6R107

L T P C
3 1 - 3

Course Objective: This course discusses the basic concepts, theories, and techniques for service-oriented computing, standards related to Web services, approaches for the description, discovery, and composition of Web services including Emerging techniques for addressing challenges that are unique to services will be discussed in this course.

Course Outcome: This course will enable students to:

- Design, develop and test Web services.
- Learn standards related to Web services: Web Services Description Language (WSDL)
- Simple Object Access Protocol (SOAP), and Universal Description, Discovery and Integration (UDDI). Learn basic principles of Service-Oriented Architecture and apply these concept.
- Develop a sample application Conceptually model Web services and formulate specifications of them in the Resource
- Description Framework (RDF) and the Web Ontology Language (OWL). Learn approaches to compose services.
- Evaluate emerging and proposed standards for the main components of Web services architectures.

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, 2006.
 6. J2EE Wer 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
COMPUTER FORENSICS
(Professional Elective-I)

Code: 6R108

L T P/D C
4 - - 4

Course objectives: This course aims to provide an understanding Computer forensics fundamentals analyze various computer forensics technologies and provide computer forensics systems and to identify methods for data recovery and apply the methods for preservation of digital evidence.

Course Outcomes:

- Understands the importance of Forensics and Conduct digital investigations that conform to accepted professional standards and are based on the investigative process: identification, preservation, examination, analysis and reporting
- Cite and adhere to the highest professional and ethical standards of conduct, including impartiality and the protection of personal privacy
- Identify and document potential security breaches of computer data that suggest violations of legal, ethical, moral, policy and/or societal standards
- Apply a solid foundational grounding in computer networks, operating systems, file systems, hardware and mobile devices to digital investigations and to the protection of computer network resources from unauthorized activity
- Work collaboratively with clients, management and/or law enforcement to advance digital investigations or protect the security of digital resources
- Access and critically evaluate relevant technical and legal information and emerging industry trends
- Communicate effectively the results of a computer, network and/or data forensic analysis verbally, in writing, and in presentations to both technical and lay audiences

UNIT – I:

Computer Forensics Fundamentals: what is Computer Forensics? ,use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to human resource/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer forensics specialists.

Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law enforcement – Computer Forensic Technology-Types of Business Computer Forensic Technology.

UNIT – II:

Computer Forensics Evidence and Capture: Data Recovery Defined-Data Back-up and Recovery – The Role of Back-up in Data Recovery-The Data Recovery Solution.

Evidence Collection and Data Seizure: Why Collect Evidence? Collection options-Obstacles- Types of Evidence- the Rules of Evidence-Volatile Evidence-General Procedure- Collection and Archiving- Methods of Collection-Artifacts-Collection Steps-Controlling Contamination: The Chain of Custody.

UNIT - III:

Duplication and preservation of Digital Evidence: Preserving the digital Crime Scene – Computer Evidence Processing Steps – Legal Aspects of Collecting and Preserving Computer Forensic Evidence

Computer Image Verification and authentication: Special Need of Evidential Authentication – Practical Consideration - Practical Implementation.

UNIT – IV:

Computer Forensic analysis and validation: Determining what data to collect and analyze, validating forensic data. Addressing data –hiding techniques, performing remote acquisitions

Network Forensic : Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

UNIT – V:

Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scene, preparing for a search, securing a computer incident or crime scene, seizing digital evidence, storing at the scene, storing digital evidence, obtain a digital hash, reviewing a case

Current Computer Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensic software.

UNIT – VI:

E-Mail Investigations: Exploring the role of E-mail in investigation, exploring the role of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail server, using specialized e-mail forensic tools

Cell phone and mobile device forensics: understanding mobile device forensics, understanding acquisition procedures for cell phone and mobile devices

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOKS:

1. Computer Forensics and Investigations by Phillips, Nelson, Steuart, CENGAGE Learning.
2. Computer Forensics, computer crime Investigations by John –R Vacca Fire wall Media, New Delhi

REFERENCE BOOKS:

1. Real Digital Forensics by keith j.jones,Richard bejtlich, Curtis W. Rose, Addison – Wesley Pearson Education.
 2. Forensic Compiling , A Tractitioneris Guide by tony sammes and brian jenkinson, springer international edition.
 3. Computer Evidence Collection & Presentation by Christopher L .T.Brown ,Firewall Media.
 4. Homeland Security, Techniques & Technologies by Jesus Mena, Firewall Media.
 5. Software Forensics Collecting Evidence from the scene of a Digital Crime by Robert M. Slade, TMH2006.
 6. Windows Forensics by Chad Steel, Wiley India Edition.
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M.Tech I YEAR I SEMESTER
Computer Networks and Information Security
Distributed Systems
(Professional Elective-II)

6R109

L T P C
3 1 - 3

Course Objectives: To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols and to gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit .

Course Outcomes: Upon successful completion of this course you should be able to:

- Demonstrate knowledge of the basic elements and concepts related to distributed system technologies;
- Demonstrate knowledge of the core architectural aspects of distributed systems;
- Design and implement distributed applications;
- Demonstrate knowledge of details the main underlying components of distributed systems (such as RPC, file systems);
- Use and apply important methods in distributed systems to support scalability and fault tolerance;
- Demonstrate experience in building large-scale distributed applications.

UNIT I

Characterization of Distributed Systems- Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models- Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication. Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT II

Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems- Introduction, File Service architecture, case study- SUN network file systems. Name Services-Introduction, Name Services and the Domain Name System, Case study of the Global Name Service, Case study of the X.600 Directory Service.

UNIT III

Peer to Peer Systems-Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-

Squirrel, OceanStore. Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging. Coordination and Agreement - Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT IV

Transactions and Concurrency control - Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency controls. Distributed Transactions - Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery, Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

UNIT V

Security - Introduction, Overview of Security techniques, Cryptographic algorithms, Digital signatures, Case studies-Kerberos, TLS, 802.11 WiFi.

UNIT VI

Distributed shared memory, Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study, other consistency models, CORBA case study Introduction, CORBA RMI, CORBA Services.

TEXT BOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S.Ghosh, Chapman & Hall/CRC, Taylor & Francis Group, 2010.

REFERENCE BOOKS:

1. Distributed Computing, S.Mahajan and S.Shah, Oxford University Press.
 2. Distributed Operating Systems Concepts and Design, Pradeep K.Sinha, PHI.
 3. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, Tata McGraw-Hill Edition.
 4. Reliable Distributed Systems, K.P.Birman, Springer.
 6. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
 6. Distributed Operating Systems and Algorithm Analysis, R.Chow, T.Johnson, Pearson.
 7. Distributed Operating Systems, A.S.Tanenbaum, Pearson education.
 8. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani & Mukesh Singhal, Cambridge, rp 2010
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M.Tech I YEAR I SEMESTER
Computer Networks and Information Security
INFORMATION RETRIEVAL SYSTEMS
(Professional Elective-II)

6R110

L T P C
3 1 - 3

Course Objectives: The objective of this course is to elaborate on the fundamentals of information retrieval (IR), study of indexing, search, relevance, classification, organisation, storage, browsing, visualisation, etc. Focus on prominent computer algorithms and methods used in the field from a computer scientist's perspectives.

Course Outcomes:

- Understanding the basics of Information retrieval like what is a corpus, what is precision and recall of an IR system
- Understanding the data structures like Inverted Indices used in Information retrieval systems
- Understanding the basics of web search
- Understanding the different techniques for compression of an index including the dictionary and its posting list
- Understanding the different components of an Information retrieval system
- Developing the ability of develop a complete IR system from scratch

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, 2nd Edition, Springer, 2004.
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M.Tech I year I semester
Computer Networks and Information Security
SEMANTIC WEB AND SOCIAL NETWORKS
(Professional Elective-II)

6R111

L T P C
4 - - 3

Course Objectives: This course addresses the issues needed to realize the vision of the Semantic Web through the use of Intelligent Agents. The objectives are : - to understand semantic web - to understand the role of ontology and inference engines in semantic web.

Course Outcomes: Students will be able to

- Demonstrate knowledge and be able to explain the three different “named” generations of the web.
- Demonstrate the ability to participate materially in projects that develop programs relating to Web applications and the analysis of Web data.
- Be able to understand and analyze key Web applications including search engines and social networking sites.
- Be able to understand and explain the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.
- Be able to analyze and explain how technical changes affect the social aspects of Web-based computing.
- Be able to develop “linked data” applications using Semantic Web technologies.

Unit I: Web Intelligence

Thinking and Intelligent Web Applications, The Information Age , The World Wide Web, Limitations of Todays 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
DATABASE SECURITY
(Professional Elective-II)

6R112

L T P C
3 1 - 3

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 II semester
Computer Networks and Information Security
JAVA PROGRAMMING LAB

6R171

L T P C
- - 4 2

Course Objectives: To build software development skills using java programming for real world applications and to implement frontend and backend of an application and implement classical problems using java programming.

Course Outcomes:

- Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Be aware of the important topics and principles of software development.
- Have the ability to write a computer program to solve specified problems.
- Be able to use the Java SDK environment to create, debug and run simple Java programs.

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 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 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
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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 MD6 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.
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M.Tech I year I semester
Computer Networks and Information Security
RESEARCH METHODOLOGY

6P115

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Outcome of RM**After completing the course students are able to understand**

- 1) Study the concepts of Research, Characteristics and Prerequisites of research, Research needs in Engineering, Education, Science and Management.
- 2) Study the concepts of conducting a literature search, Evaluating, Organizing, and synthesizing the literature.
- 3) Identifying and describing the research, finding the research Problem, Sources of research problem
- 4) Perform Quantitative / Qualitative Research Design, basic principles of research design.
- 5) Familiar with concept of formatting a research proposal.
- 6) Familiar with writing Research report

UNIT-I**1. Research Methodology: An Introduction**

Meaning of Research, Objectives of Research Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method. Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India,

UNIT-II**2. Defining the Research Problem**

What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration, Conclusion .

UNIT-III

3. Research Design

Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Developing a Research Plan, Conclusion.

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UNIT-IV

4. Sampling Design

Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample, Random Sample from an Infinite Universe, Complex Random Sampling Designs, Conclusion.

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UNIT-V

5. Methods of Data Collection

Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data.

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UNIT-VI

6. Concept of Hypothesis and Testing

What is a Hypothesis? Basic Concepts Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Tests of Hypotheses. Important Parametric Tests, Hypothesis Testing of Correlation Coefficients, Limitations of the Tests of Hypotheses, Chi-square as a Test for Comparing Variance, Chi-square as a Non-parametric Test, Conditions for the Application of χ^2 Test, Steps Involved in Applying Chi-square Test.

Text Books

1. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006
2. Donald H.McBurney, Research Methods, 6th Edition, Thomson Learning, ISBN:81-316-0047-0,2006

Reference Books

1. Donald R. Cooper, Pamela S. Schindler, Business Research Methods, 8/e, Tata McGraw-Hill Co. Ltd., 2006.
 2. Fuzzy Logic with Engg Applications, Timothy J.Ross, Wiley Publications, 2nd Ed[d]
 3. Simulated Annealing: Theory and Applications (Mathematics and Its Applications, by P.J. van Laarhoven & E.H. Aarts[e]
 4. Genetic Algorithms in Search, Optimization, and Machine Learning by David E. Goldberg
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M.Tech I year I semester
Computer Networks and Information Security
LITERATURE REVIEW & SEMINAR - I

Code: 6R172

L T P C
- - 3 1
Max Marks 100

Course Objective : To synthesise and critically evaluate peer-reviewed literature relevant to your Research.

Course Outcomes :

- integrate relevant theory and evidence in a logical way and draw appropriate conclusions.
- critically evaluate the research methodologies used in the literature you cite.
- demonstrate logical structure and organization of your ideas through the use of appropriate headings, summary statements, and smooth links between sections.

After studying this course, the students will be able to

Identify a research topic

1. Collect literature
2. Present seminar
3. Discuss the queries

There shall be three 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 25 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 : 5marks
- Final Report : 5 marks
- Presentation : 15 marks

A Student has to concentrate on the following sections while writing technical paper or presenting seminar.

Contents:

- Identification of specific topic, Analysis
- Organization of modules, Naming Conventions
- Writing style, Figures
- Feedback, Writing style
- Rejection & Miscellaneous

REFERENCES:

Teach Technical Writing in Two Hours per Week by Norman Ramsey

For Technical Seminar the student must learn few tips from sample seminars and correcting himself, which is continues learning process

REFERENCE LINKS:

1. <http://www.cs.dartmouth.edu/~scot/givingTalks/sld001.htm>
2. <http://www.cse.psu.edu/~yuanxie/advice.htm>
3. <http://www.eng.unt.edu/ian/guides/postscript/speaker.pdf>

NOTE: A student can use any references for this process, but must be shared in classroom.

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

Code: 6R173

L T P C
- - - 1

Max. Marks: 100

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There shall be a Comprehensive Viva-Voce in I 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 Internal Committee and for 50 marks by the External Committee.

A candidate has to secure a minimum of 50% to be declared successful.

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

6R201

L T P C
3 1 - 3

Course Objective : Acquire solid knowledge on mobile networks and mobile computing and acquire experience and capability to team work and become familiar with mobile game development

Course Outcomes:

- Able to apply advanced data communicating methods and networking protocols for wireless and mobile environments
- Able to utilize and employ application frameworks for developing mobile applications including under disconnected and weakly connected environment
- To create web sites suitable for mobile environments
- Able to select components and networks for particular application
- Able to creatively analyze mobile and wireless networks
- Able to critically analyse security issues of mobile and wireless computing systems
- To design and implement simple mobile games

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, 2nd 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
NETWORK SECURITY

6R202

L T P C
3 1 - 3

Course Objective : Students are expected to demonstrate the ability to: Identify computer and **network security** threats, classify the threats and develop a **security** model to prevent, detect and recover from the attacks.

Course Outcomes: Students are expected to demonstrate the ability to:

- Identify computer and network security threats, classify the threats and develop a security model to prevent, detect and recover from the attacks.
- Encrypt and decrypt messages using block ciphers, sign and verify messages using well known signature generation and verification algorithms.
- Analyze existing authentication and key agreement protocols, identify the weaknesses of these protocols.
- Download and install an e-mail and file security software, PGP, and efficiently use the code to encrypt and sign messages
- Develop SSL or Firewall based solutions against security threats, employ access control techniques to the existing computer platforms such as Unix and Windows NT.
- Write an extensive analysis report on any existing security product or code, investigate the strong and weak points of the product or code.

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 Vulnerabilites **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, 2nd 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, 2nd 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

6R203

AD HOC AND SENSOR NETWORKS

Course Objectives: To provides a detailed treatment of proactive, reactive, and hybrid routing protocols in mobile wireless networks.

Course Outcomes:

- Will be able to understand of the principles of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
- understand the principles and characteristics of wireless sensor networks (WSNs).
- Learn how proactive protocols function and their implications on data transmission delay and bandwidth consumption.
- Learn how reactive routing protocols function and their implications on data transmission delay and bandwidth consumption.
- Understands how proactive routing protocols function and their implications on data transmission delay and bandwidth consumption
- Learn how reactive routing protocols function and their implications on data transmission delay and bandwidth consumption. And become familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs. 8. Student have acquired skills to design and implement a basic mobile ad hoc or wireless sensor network via simulations or programming of PDAs.

UNIT I

Ad Hoc Wireless Networks: Introduction, Issues in Ad hoc wireless networks, Ad hoc wireless Internet

MAC protocols for Ad hoc Wireless Networks Issues in Designing a MAC Protocol for Ad hoc

Wireless Networks, Design Goals for a MAC Protocol for Ad hoc Wireless Networks, Classifications of the MAC Protocols, Other MAC Protocols.

UNIT II

Routing Protocols for Ad Hoc Wireless Networks Issues in Designing a Routing Protocol for Adhoc Wireless Networks, Classifications of Routing Protocols

Transport Layer for Ad Hoc Wireless Networks Issues in Designing a Transport layer protocol for Ad hoc Wireless Networks, Design goals of a Transport layer protocol for Ad hoc Wireless Networks,

Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Other Transport layer protocols for Ad hoc Wireless Networks.

UNIT III

Security protocols for Ad hoc Wireless Networks Security in Ad hoc Wireless Networks, Network

Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks,

Key Management, Secure Routing in Ad hoc Wireless Networks

UNIT IV

Basics of Wireless, Sensors and Applications: The Mica Mote, Sensing and Communication

Range, Design Issues, Energy consumption, Clustering of Sensors, Applications

UNIT V

Sensor Network Hardware: Components of Sensor Mote,

Data Retrieval in Sensor Networks: Classification of WSNs, MAC layer, Routing layer, Transport

layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT VI

Operating System in Sensors– TinyOS, LA-TinyOS, SOS, RETOS

Imperative Language: nesC, Dataflow style language: TinyGALS, Node-Level Simulators, ns-2 and its sensor network extension, TOSSIM

TEXT BOOKS:

1. Adhoc Wireless Networks – Architectures and Protocols, C.Siva Ram Murthy, B.S.Murthy, Pearson Education, 2004
2. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma P. Aggarwal*, World Scientific Publications / Cambridge University Press, March 2006
3. Wireless Sensor Networks – Principles and Practice, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010

REFERENCE BOOKS:

1. Wireless Sensor Networks: An Information Processing Approach, *Feng Zhao, Leonidas Guibas*, Elsevier Science imprint, Morgan Kauffman Publishers, 2006, rp2009
 2. Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008.
 3. Ad hoc Networking, *Charles E. Perkins*, Pearson Education, 2001.
 4. Wireless Ad hoc Networking, *Shih-Lin Wu, Yu-Chee Tseng*, Auerbach Publications, Taylor & Francis Group, 2007
 6. Wireless Ad hoc and Sensor Networks – Protocols, Performance and Control, Jagannathan
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M.Tech I year II semester

Computer Networks and Information Security

INFORMATION SECURITY MANAGEMENT AND STANDARDS

6R204

L T P C
3 1 - 3

Course Objective: Emphasis on the management of information security efforts as well as progression in adopting this field within IT organization. This course also discusses various administrative, technical, governance, regularity and policy aspects of Information Security Management.

Course Objectives:

- Ability to conduct research and to utilize analytical skills in articulating information technology investment strategies that align with business strategies.
- Understanding elements of organizational function processes, work practices and human resource capital as integrated components to address technical, logistical and business challenges and to provide paradigm shift in IT service delivery and to explore alternative opportunities to contain cost without impacting organizational mission.
- Students will demonstrate effective oral and writing communication skills necessary to be effective and to compete at global business environment.
- Students will demonstrate an ability to understand sourcing issues involving global IT providers and terms.
- Students will apply this knowledge for selecting and evaluating information technology vendors, partners and service providers to augment in-house skills.
- Students will develop the necessary skills to examine security management progression within an organization including training, policy development, governance, organizational model, risk assessment and mitigation, security management models as well as integration of project management techniques.
- Understands Legal, Ethical, and professional Issues in Information Security

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)

6R205

L T P C
3 1 - 3

Course Objective The course aims to train students how to use hacking tools and techniques to assess the security posture of a given IT network or system. Upon completing the course, students will be able to scan, test, hack and secure IT systems. They will be given hands-on training in penetration testing and other testing methodologies to ensure the security of an organization's information systems.

Course Objectives:

- Understand the students how to scan, test, hack and secure their own systems.and practical experience with the current essential security systems.
- Students will begin by understanding how perimeter defenses work and then be lead into scanning and attacking their own networks, no real network is harmed. Students then learn how intruders escalate privileges and what steps can be taken to secure a system.
- Students will also learn about Intrusion Detection, Policy Creation, Social Engineering, DDoS Attacks, Buffer Overflows and Virus Creation.
- Understand Ethical hacking and Leality in depth
- Student will be able to understand Scanning, types of Scanning in depth

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

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

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

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

CLOUD COMPUTING
(Professional Elective– III)

6R206

L T P C
3 1 - 3

Course Objectives: Understand various basic concepts related to **cloud computing** technologies. Understand the architecture and concept of different **cloud** models: IaaS, PaaS, SaaS. ... Create application by utilizing **cloud** platforms such as Google app Engine and Amazon Web Services (AWS)

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, Oreilly 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)

6R207

L T P C
3 1 - 3

Course Outcomes:

- Provide students with a high level understanding of how information security functions in an organization.
- To master information security governance, and related legal and regulatory issues,
- To master understanding external and internal threats to an organization,
- To be familiarity with information security awareness and a clear understanding of its importance,
- To be familiar with how threats to an organization are discovered, analyzed, and dealt with,
- To master fundamentals of secret and public cryptography, • To master protocols for security services

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 2006.

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 2006.
 3. Guide to Wireless Network Security, Springer.
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M.Tech I year II semester
Computer Networks and Information Security
BIG DATA ANALYTICS
Professional Elective – III

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

6R208

Course Objective: Introduce students the concept and challenge of big data and teach students in applying skills and tools to manage and analyze the big data.

Course Outcomes:

- To understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data;
- To collect, manage, store, query, and analyze various form of big data
- To gain hands-on experience on large-scale analytics tools to solve some open big data problems;
- To understand the impact of big data for business decisions and strategy

UNIT I

INTRODUCTION TO BIG DATA: Introduction to BigData Platform – Traits of Big data -Challenges of Conventional Systems - Web Data – Evolution Of Analytic Scalability - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - ReSampling - Statistical Inference - Prediction Error.

UNIT II

DATA ANALYSIS : Regression Modeling - Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction - Neural Networks: Learning And Generalization - Competitive Learning - Principal Component Analysis and Neural Networks - Fuzzy Logic: Extracting Fuzzy Models from Data - Fuzzy Decision Trees - Stochastic Search Methods.

UNIT III

MINING DATA STREAMS : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT IV

FREQUENT ITEMSETS AND CLUSTERING : Mining Frequent Itemsets - Market Based Model – Apriori Algorithm – Handling Large Data Sets in Main Memory – Limited Pass Algorithm – Counting Frequent Itemsets in a Stream – Clustering Techniques – Hierarchical – K-Means – Clustering High Dimensional Data – CLIQUE And PROCLUS – Frequent Pattern based Clustering Methods – Clustering in NonEuclidean Space – Clustering for Streams and Parallelism.

UNIT V

FRAMEWORKS AND VISUALIZATION : MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction Techniques;

UNIT VI:

Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association Intelligence from unstructured information-Text analytics-Understanding of emerging trends and technologies-Industry challenges and application of Analytics

TEXT BOOKS:

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
 2. AnandRajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
 3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
 4. Glenn J. Myatt, “Making Sense of Data”, John Wiley & Sons, 2007
 6. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.
 6. Jiawei Han, MichelineKamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008.
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M.Tech I year II semester
Computer Networks and Information Security
BIO INFORMATICS
Professional Elective – III

PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
✓	✓	✓		✓	✓

Code: 6QC47

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UNIT I : SCOPE OF BIOINFORMATICS and BIOLOGICAL DATABASES

History, definition,, importance and applications of bioinformatics, Introduction to biological data, Organization and management of databases, Nucleotide databases (Genbank,), Protein Databases(SWISS PROT)

UNIT II: SEQUENCE ALIGNMENT

Basic concepts of sequence homology Dynamic Programming, Dot Matrix analysis, Smith-Waterman Algorithm , Needleman-Wunsch Algorithm ,Scoring matrices: PAM and BLOSUM matrices

UNIT III: SEQUENCE-BASED DATABASE SEARCHES

BLAST and FASTA algorithms, various versions of basic BLAST and FASTA, Use of these methods for sequence analysis including the on-line use of the tools and interpretation of results.

UNIT IV: MULTIPLE SEQUENCE ALIGNMENT

Basic concepts of various approaches for MSA (e.g. progressive, hierarchical etc.). Algorithm of CLUSTALW and its application

UNIT V: PHYLOGENETIC ANALYSIS

Definition and description of phylogenetic trees. Distance based and character based methods of phylogenetic analysis.

UNIT VI: PROTEIN STRUCTURE PREDICTION

Secondary structure prediction methods, Algorithms of Chou Fasman, GOR methods. Protein homology modeling.

TEXT BOOKS:1. Bioinformatics. David Mount, 2000. CSH Publications

REFERENCES:

1. Bioinformatics: A Machine Learning Approach P. Baldi. S. Brunak, MIT Press 1988.
2. Genomics and Proteomics-Functional and Computational aspects. Springer Publications. Editor-Sandor Suhai.
3. Bioinformatics- Methods and Protocols-Human Press. Stephen Misener, Stephen A. Krawetz.
4. Bioinformatics – A Practical guide to the Analysis of Genes and Proteins – Andreas D.Baxevanis, B.F. Francis Ouellette.

PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
✓		✓		✓	

L **T** **P/D** **C**
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M.Tech I year II semester
Computer Networks and Information Security
ENTREPRENEURSHIP AND INNOVATION
Open Elective – I

6ZC13

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 OPERATIONS, INSURANCE & RISK MANAGEMENT
Open Elective – I

6ZC03

Course Objective: The objective of the course is to provide 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 Evariantly
- Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.
- Reddy K S and Rao R N: Banking and Insurance, Paramount publishers, 2013

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
Open Elective – I

6QC33

Unit I: Introduction: Discovery, Creativity, Innovation, Invention, Need for IPR, Types of IPR, Genesis & development of IPR in India

Unit II: Patents: Definition, Scope, Protection, Patentability Criteria, Types of Patents (Process, Product & Utility Models), Case studies on Patents (Basmati Rice, Turmeric, Neem), Software Patenting.

Unit III: Patent Searching & Filing: Types of Searching, Public & Private Searching Databases, Drafting & Filing of Patent applications, Patent Cooperation Treaty (PCT), Patent infringement.

Unit IV: Types of IPR-I: Copyrights – Definition, granting, infringement, searching & filing, distinction between copy rights and related rights; Trade Marks - role in commerce, importance, protection, registration, Domain names; Case Studies.

Unit V: Types of IPR-II: Trade Secrets, Unfair competition; Industrial Designs – Scope, protection, filing, infringement; Semiconductors, Integrated Circuits & Layout design; Geographical Indications & Appellations of Origin; Case Studies.

Unit VI: International and National Conventions & Treaties: Overview, WTO, GATT, TRIPS, WIPO, Berne Convention, Universal Copyright Convention, the Paris Convention, Madrid Protocol, Rome convention, Budapest Treaty, Hague agreement, Locarno agreement, Indian Patents Law, Copyright Law, Trademark Law, Trade secret Law, GI Law, Designs Act.

Text Book:

1. Deborah E. Bouchoux, Intellectual Property for Paralegals – The law of Trademarks, Copyrights, Patents & Trade secrets, 3rd Edition, Cengage learning, 2012
2. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property, Eastern Book Company, Lucknow, 2009.

References:

1. M. M. S. Karki , Intellectual Property Rights: Basic Concepts, Atlantic Publishers, 2009
2. Neeraj Pandey & Khushdeep Dharni, Intellectual Property Rights, Phi Learning Pvt. Ltd
3. Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd, 2006.
4. B. L. Wadehra. Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000.
5. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010

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**M.Tech I year II semester - CNIS
EMBEDDED SYSTEMS
Open Elective – I**

Code: 6T217

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UNIT-1

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

Unit – II

8061 Micro controller : Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts. (Chapter 3 from Text Book 2, Ayala).

UNIT-III

Basic Assembly Language Programming Concepts : The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8061. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instruction. (Chapters 4,6,6,7 and 8 from Text Book 2, Ayala).

UNIT –IV

8061 Interfacing : Interfacing with Keyboards, Displays, D/A and A/D Converters, Programming 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. (Chapter 6 and 7 from Text Book 3, Simon).

UNIT – VI

Basic Design Using a Real-Time Operating System : Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS uC-OS / Vx-Works / RT Linux; 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. (Chapter 8,9,10 & 11 from Text Book 3, Simon).

TEXT BOOKS:

1. Computers and Components, Wayne Wolf, Elsevier.
2. The 8061 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
3. An Embedded Software Primer, David E. Simon, Pearson Education.

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.

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M.Tech I year II semester
Computer Networks and Information Security
ETHICS, MORALS, GENDER SENSITIZATION AND YOGA
Open Elective – I

Code: 6H233

L	T	P/D	C
1	1	-	1

COURSE OUTCOMES

Students will be able to

- Discriminate between right and wrong from their own behavior and judge the same in others.
- Understand how moral development involves thoughts, feelings, and behaviors regarding right and wrong and get intrapersonal and interpersonal dimensions.
- Understand Engineer's Responsibility for safety and risk.
- Understand rules and principles set by the society in a customary way.
- Perceive gender literacy and understand the importance of gender perspective and in turn delve into gender issues.
- Understand and appreciate the importance of yoga for an enriched life style.

UNIT I: HUMAN VALUES AND MORALS

Why Value Education, Understanding Social Factors, System, Structure and Source of Generic Values; Morals, Values and Ethics; Integrity; Work Ethics; Service Learning-Civic Virtue-Respect for Others-Living Peacefully-Caring-Sharing; Honesty; Courage; Value Time; Cooperation; Commitment; Empathy; Self Confidence; Spirituality; Character; Loyalty; Confidentiality

UNIT II: ENGINEERING ETHICS AND PERSONALITY DEVELOPMENT

Ethical Principles, Ethical Theories, , Use of Ethical Theories, Types of Inquiry, Engineering and Ethics, Engineering Ethics, Moral Autonomy of Engineers, Professional Ethics, Consensus and Controversy, Ethics in Business, Global business, Understanding Factors of Success, Human Aspirations, Personality and Our Identity, Understanding SELF, Happiness and Self-Interest, Positive Thinking, Custom and Religion, Understanding responsibility toward society, Understanding National and cultural Ethos; Professionalism

UNIT III:ENGINEERING AS SOCIAL EXPERIMENTATION

Comparison with Standard Experiments; Knowledge Gained; Learning from the Past; Engineer as Manager, Consultants and leaders and responsible social Experimenter; Engineers personality Trait, Big Five Personality model, Conscientiousness ,Accountability- Roles of Codes-Codes and Experimental Nature of Engineering; Engineer's Responsibility for safety and Risk, Concept of Safety-Types of Risks

UNIT IV: GLOBAL PERSPECTIVE

Distinguish between Bribes and Gifts; Occupational Crimes; Globalization- Cross-Cultural Issues; Environmental Ethics; Internet and Computer Codes of Ethics

Case Study:

Ethics in Military and Weapons Development-Ethics in Research work

UNIT V: GENDER SENSITIZATION

Introduction to Gender Study; Introduction to Gender Spectrum; Point of view; Gender and Structure of Knowledge; Contribution of Women in growth and development as Technologist, Scientist, R&D, GDP, Social Life, National Development, International Perspective”- Life Exemplary Madame Curie, Durga bai Deshmukh, Kalpana Chawla, Chanda Kochar, Mary Kom, Indra Gandhi, Mother Teresa, Indra Nooyi, Golda Meir, Margaret Thatcher and other achievers

UNIT VI: YOGA

Introduction to Yoga in India; Origin and Development; Theoretical understanding of yoga; Stress Management : Modern and Yogic perspectives ; Tackling ill-effects of Frustration, Anxiety and Conflict through modern and Yogic methods; Meditation Techniques; Suryanamaskar; Pranayama.

TEXT BOOKS:

1. *Indian Culture Values And Professional Ethics(For Professional Students)* by Prof.P.S.R.Murthy ; B.S.Publications.
2. *Professional Ethics and Human Values* by M. Jayakumar, Published by University Science Press,
3. Telugu Academy, Hyderabad, 2016, *Towards A World of Equals*, A Bilingual Text Book on Gender.

REFERENCE BOOKS:

1. *The Yoga Sutras of Patanjali* by Swami Satchitananda
 2. *The Secret Power of Yoga* by Nischala Joy Devi
 3. *Light on Pranayama* by B.K.S. Iyengar
 4. *Books on the Art of Living* by Poojya Sri Sri Ravi Shanker
 5. *Making It Relevant: Mapping the meaning of women’s studies in Tamilnadu* by Anandi S and Swamynathan P
 6. *Feminism is for Everybody; Passionate Politics* by Bell Hooks
 7. *Gender* by Geetha V
 8. *“Growing up Male” in what is worth teaching* by K Kumar
 9. *The Lenses of Gender: Transforming the Debate on Sexual Inequality* - Sandra Lipsitz Bem
 10. *The Lenses Of Gender* - by ANNE MURPHY
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M.Tech I year II semester
Computer Networks and Information Security
INFORMATION SECURITY THROUGH JAVA LAB

6R271

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PART – A

The following exercises are based on the cryptographic algorithms. They can be implemented using C, C++, Java, etc.

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 displays 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 MD6 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.
21. Study phishing in more detail. Find out which popular bank sites have been phished and how.

PART - B

The following exercises have to be performed using various software tools/utilities mentioned

1. **Passive Information Gathering**
 - a. IP Address and Domain Identification of log entries – DNS, RIR, etc tools
 - b. Information Gathering of a web site: WHOIS, ARIN, etc tools
 - c. Banner Grabbing: Netcat, etc tools
2. **Detecting Live Systems**
 - a. Port Scanning : Nmap,SuperScan
 - b. Passive Fingerprinting: Xprobe2
 - c. Active Fingerprinting: Xprobe2
3. **Enumerating Systems**
 - a. SNMP Enumeration: SolarWinds IP Network Browser, www.solarwinds.com/downloads
 - b. Enumerating Routing Protocols: Cain & Abel tool, www.oxid.it
4. **Automated Attack and Penetration Tools**
 - a. Exploring N-Stalker, a Vulnerability Assessment Tool, www.nstalker.com
5. **Defeating Malware**
 - a. Building Trojans, Rootkit Hunter: www.rootkit.nl/projects/rootkit_hunter.html
 - b. Finding malware
6. **Securing Wireless Systems**
 - a. Scan WAPs: NetStumbler, www.netstumbler.com/downloads
 - b. Capture Wireless Traffic: Wireshark, www.wireshark.org

TEXT BOOK:

1. Build Your Own Security Lab, Michael Gregg, Wiley India.
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M.Tech I year II semester
Computer Networks and Information Security
LITERATURE REVIEW & SEMINAR - II

6R272

L T P C
- - 3 1
Max. Marks: 100

After studying this course, the students will be able to

1. Identify a research topic
2. Collect literature
3. Write technical review paper
4. Present seminar
5. Discuss the queries and Publish research paper

There shall be three 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 26 marks. A candidate has to secure a minimum of 60% 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 : 5 marks
- Final Report : 5 marks
- Presentation : 15 marks

A Student has to concentrate on the following sections while writing technical paper or presenting seminar.

Contents:

- Identification of specific topic, Analysis
- Organization of modules, Naming Conventions
- Writing style, Figures
- Feedback, Writing style
- Rejection& Miscellaneous

REFERENCES:

Teach Technical Writing in Two Hours per Week by Norman Ramsey

For Technical Seminar the student must learn few tips from sample seminars and correcting himself, which is continues learning process

REFERENCE LINKS:

1. <http://www.cs.dartmouth.edu/~scot/givingTalks/sld001.htm>
2. <http://www.cse.psu.edu/~yuanxie/advice.htm>
3. <http://www.eng.unt.edu/ian/guides/postscript/speaker.pdf>

NOTE: A student can use any references for this process, but must be shared in classroom.

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

Code: 6R274

L T P C
- - 3 2

Max. Marks: 100

PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
✓	✓	✓	✓	✓	✓

In I year II semester, a project seminar shall be conducted for 25 marks and for 2 credits (there is no external evaluation). 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 10 marks and the end semester seminar evaluation shall carry 15 marks. The report for the mid-semester project seminar will carry 5 marks and remaining marks shall be for presentation and discussion. The report for end semester project seminar shall be for 5 marks and the remaining marks shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

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

Code: 6R273

L T P C
- - - 1

Max. Marks: 100

PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
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There shall be a Comprehensive Viva-Voce in I year II 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 Internal Committee and for 50 marks by the External Committee.

. A candidate has to secure a minimum of 50% to be declared successful.

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**M.Tech IInd year I semester
Computer Networks and Information Security
PROJECT WORK REVIEW - I**

Code: 6R371

L T P C
- - - 12

Max. Marks: 100

In II year I semester, a project work review shall be done by PRC for 100 marks and for 12 credits (there is no external evaluation) in each of the semester. The evaluation for the project reviews shall be done in 4 stages (not less than 4 weeks between two consecutive stages) including end semester evaluation.

Each stage project review shall carry 20 marks and the end semester review shall carry 40 marks (50% by PRC and 50% by supervisor). The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey and design in Project Review- I. A candidate shall secure a minimum of 50% to be declared successful in Project Review- I. If candidate fails to fulfill minimum marks, he has to reappear during the supplementary examination.

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**M.Tech IInd year II semester
Computer Networks and Information Security
PROJECT WORK REVIEW- II**

Code: 6R471

L T P C
- - - 12

Max. Marks: 100

In II year II semester, a project work review shall be done by PRC for 100 marks and for 12 credits (there is no external evaluation) in each of the semester. The evaluation for the project reviews shall be done in 4 stages (not less than 4 weeks between two consecutive stages) including end semester evaluation.

Each stage project review shall carry 20 marks and the end semester review shall carry 40 marks (50% by PRC and 50% by supervisor). In the case of Project Review II, the Supervisor and PRC will examine implementation, testing and final execution of the project. A candidate shall secure a minimum of 50% to be declared successful in Project review II. If candidate fails to fulfill minimum marks, he has to reappear during the supplementary examination.

**M.Tech IInd year II semester
Computer Networks and Information Security
PROJECT WORK (VIVA-VOICE)**

Code: 6R472

L	T	P	C
-	-	-	24

Course Objective :

**Max.
Marks: 200**

To develop solutions for networking and security problems, balancing business concerns, technical issues and security. And to independently carry out research /investigation and development work to solve practical problems multi disciplinary areas. .

EVALUATION OF PROJECT/DISSERTATION WORK

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

1. A Project Review Committee (PRC) shall be constituted with Head of the Department as Chairperson, Project Supervisor and one senior faculty member of the Departments offering the M. Tech. Programme.
2. Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects, both theory and practical.
3. After satisfying 2, 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 approval. Only after obtaining the approval of the PRC the student can initiate the Project work.
4. If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the PRC. However, the PRC shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.
5. A candidate shall submit his project status report in four stages at least with a gap of 4 weeks between two consecutive stages.
6. The work on the project shall be initiated at the beginning of the II year and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of all theory and practical courses (no backlogs) with 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 make an oral presentation before the PRC.
7. After approval from the PRC, the soft copy of the thesis should be submitted to the College for ANTI-PLAGIARISM for the quality check and the plagiarism report should be included in the final thesis. If the copied information is less than 24%, then only thesis will be accepted for submission.

8. Three copies of the Project Thesis certified by the supervisor shall be submitted to the College.
9. In II year I semester and II semester, a project work review I and II shall be done by PRC for 100 marks and for 12 credits (there is no external evaluation) in each of the semester. The evaluation for the project reviews shall be done in 4 stages (not less than 4 weeks between two consecutive stages) including end semester evaluation. Each stage project review shall carry 20 marks and the end semester review shall carry 40 marks (50% by PRC and 50% by supervisor). The Supervisor and PRC will examine the Problem Definition, Objectives, Scope of Work, Literature Survey and design in Project Review I. In the case of Project Review II, the Supervisor and PRC will examine implementation, testing and final execution of the project. A candidate shall secure a minimum of 50% to be declared successful in Project review I and II. If candidate fails to fulfill minimum marks, he has to reappear during the supplementary examination.
10. For Project Evaluation (Viva Voce) in II Year II Sem. there are external marks of 200 for 24 credits. HoD shall submit a panel of 3 examiners, eminent in that field. Principal will appoint one of them as examiner.
11. The thesis shall be adjudicated by examiner selected by the College. If the report of the examiner is not favourable, the candidate shall revise and resubmit the Thesis. If the report of the examiner is unfavourable again, the thesis shall be summarily rejected.
12. If the report of the examiner is favourable, Project Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the Thesis. Candidate has to secure minimum of 50% marks in Project Evaluation (Viva-Voce) examination.
13. If he fails to fulfill as specified in 12, he will reappear for the Viva-Voce examination only after three months. In the reappeared examination also, fails to fulfill, he will not be eligible for the award of the degree.
14. The Head of the Department shall coordinate and make arrangements for the conduct of Project Viva- Voce examination.

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