COURSE STRUCTURE

AND

DETAILED SYLLABUS

COMPUTER NETWORKS AND INFORMATION SECURITY

For

M.TECH. TWO YEAR DEGREE COURSE

(Applicable for the batches admitted from 2018-19)

VAAGDEVI COLLEGE OF ENGINEERING
(Autonomous)
Bollikunta, Warangal – 506 005
Telangana State, India

VAAGDEVI COLLEGE OF ENGINEERING
AUTONOMOUS

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
M.TECH. (Computer Networks and Information Security)

COURSE STRUCTURE
(R18 Regulations applicable for the batches admitted from Academic Year 2018-19 onwards)

I-SEMESTER

S.No	Course Codes	Title of the Course	L	T	P	C
1	M18CS01	Data Structures and Algorithms	3	0	0	3
2	M18CS11	Network Programming	3	0	0	3
3		**Program Elective-I**				
	M18CN01	TCP/IP Protocol suite	3	0	0	3
	M18CN02	Android Application Development				
	M18CS03	Internet of Things				
4		**Program Elective-II**				
	M18CN03	Ethical Hacking	3	0	0	3
	M18CN04	Secure Software Design				
	M18CN05	Distributed System Security				
5	M18MC01	Research Methodology	2	0	0	2
6	M18AC01	**Audit Course-I** English for Research Paper Writing	2	0	0	0
7	M18CN06	Computer Networks and Network Programming	0	0	4	2
8	M18CN07	Internet of things Lab	0	0	4	2
		Total Credits	**16**	**0**	**8**	**18**

II-SEMESTER

S.No	Course Codes	Title of the Course	L	T	P	C
1	M18CN08	Network Security	3	0	0	3
2	M18CN09	Wireless Networks	3	0	0	3
3		**Program Elective-III**				
	M18CN10	Digital Watermarking and Stenography	3	0	0	3
	M18CN11	Security Threats				
	M18CN12	Cyber Security				
4		**Program Elective-IV**				
	M18CN13	Biometrics	3	0	0	3
	M18CN14	IT Security Metrics				
	M18CN15	Security Assesment and Risk Analysis				
5	M18AC02	**Audit Course-II** Stress Management	2	0	0	0
6	M18CN16	Network Security Lab	0	0	4	2
7	M18CN17	Security Threats Lab	0	0	4	2
8	M18CN18	Mini Project	0	0	2	2
		Total Credits	**14**	**0**	**10**	**18**

III-SEMESTER

S.No	Course Codes	Title of the Course	L	T	P	C
1		**Program Elective-V**				
2	M18CN19	Data Warehouse and Data Mining	3	0	0	3
	M18CN20	Web Search and Information Retrieval				
	M18CN21	Database Security and Access Control				
		Open Elective				
3	M18MA01	Advanced Optimization Techniques	3	0	0	3
	M18SE27	Waste Management				
	M18VL07	Embedded System Design				
4	M18CN22	Dissertation Phase-I	0	0	20	10
		Total Credits	**6**	**0**	**20**	**16**

IV-SEMESTER

S.No	Course Codes	Title of the Course	L	T	P	C
1	M18CN23	Dissertation Phase-II	0	0	32	16
		Total Credits	**0**	**0**	**32**	**16**
		Grand Total				**68**

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CS01) DATA STRUCTURES AND ALGORITHMS
(Core Course-I)

M.Tech:I-Semester **L/T/P C**
3/0/- 3

Objectives: The fundamental design, analysis, and implementation of basic data structures. Basic concepts in the specification and analysis of programs. Principles for good program design, especially the uses of data abstraction. Significance of algorithms in the computer field Various aspects of algorithm development Qualities of a good solution

UNIT I
Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Data structures-Linear and non linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation, Vector representation, singly linked lists -insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circular lists. Representation of single, two dimensional arrays, Sparse matrices and their representation.

UNIT II
Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack, implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, java.util package-ArrayList, Linked List, Vector classes, Stacks and Queues in java.util, Iterators in java.util.

UNIT III
Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining, Hashing in java.util-HashMap, HashSet, Hashtable. Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort, comparison of sorting methods.

UNIT IV
Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non recursive traversals, Java code for traversals, Threaded binary trees. Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods DFS and DFS, Java code for graph traversals, Applications of Graphs-Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path
Problem.

UNIT V
Search trees- Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees –Definition and examples only, B-Trees-definition, insertion and searching operations, Trees in java.util- TreeSet, Tree Map Classes, Tries(examples only),Comparison of Search trees. Text compression-Huffman coding and decoding, Pattern matching-KMP algorithm.

Course Outcomes:

After the completion of this course the student should be able to

1. Understand the basics of Algorithms and Analyze the performance and complexity of Algorithms
2. Explain the concepts of basic data structures: Linear and Non Linear and compare how the storage and retrieval of data is done on these data structures.
3. Gain knowledge about applications of data structures including creating, inserting, deleting, searching and sorting of data for each data structure.
4. Experiment with using linear data structures like stacks, queues and linked list for real time applications.
5. Distinguish between Trees and Graphs and the areas where best applicable.
6. Be able to decide an appropriate data structure for any specific problem.

TEXT BOOKS:

1. Data structures, Algorithms and Applications in Java, S.Sahni, Universities Press.
2. Data structures and Algorithms in Java, Adam Drozdek, 3rd edition, Cengage Learning.
3. Data structures and Algorithm Analysis in Java, M.A.Weiss, 2nd edition, Addison-Wesley (Pearson Education).

REFERENCE BOOKS:

1. Java for Programmers, Deitel and Deitel, Pearson education.
2. Data structures and Algorithms in Java, R.Lafore, Pearson education.
3. Java: The Complete Reference, 8th editon, Herbert Schildt, TMH.
4. Data structures and Algorithms in Java, M.T.Goodrich, R.Tomassia, 3rd edition,Wiley India Edition.
5. Data structures and the Java Collection Frame work,W.J.Collins, Mc Graw Hill.
6. Classic Data structures in Java, T.Budd, Addison-Wesley (Pearson Education).
7. Data structures with Java, Ford and Topp, Pearson Education.
8. Data structures using Java, D.S.Malik and P.S.Nair, Cengage learning.
9. Data structures with Java, J.R.Hubbard and A.Huray, PHI Pvt. Ltd.
10. Data structures and Software Development in an Object-Oriented Domain, J.P.Tremblay and G.A.Cheston, Java edition, Pearson Education.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CS11) NETWORK PROGRAMMING
(Core Course-II)

M.Tech: I-Semester **L/T/P C**
3/0/- 3

Objectives:

- To understand Linux utilities
- To understand file handling, signals .
- To understand IPC, network programming in Java .
- To understand processes to communicate with each other across a Computer Network.

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.Review of C programming concepts-arrays, strings (library functions), pointers, function pointers, structures, unions, libraries in C.

UNIT - II

Files- File Concept, File types File System Structure, Inodes, File Attributes, file I/O in C using system calls, kernel support for files, file status information-stat family, file and record lockinglockf and fcntl functions, file permissions- chmod, fchmod, file ownership-chown, lchown ,
fchown, links-soft links and hard links – symlink, link, unlink. File and Directory management – Directory contents, Scanning Directories- Directory file APIs. Process- Process concept, Kernel support for process, process attributes, process control – process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process.

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 mechanisms, Pipes- creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions, Introduction to 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.

UNIT – IV

Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, client/server example.Network IPC - Introduction to Unix Sockets, IPC over a network, ClientServer model ,Address formats(Unix domain and Internet domain), Socket system calls for Connection Oriented - Communication, Socket system calls for Connectionless-Communication, Example-Client/Server Programs- Single Server-Client connection, Multiple simultaneous clients, Socket options – setsockopt, getsockopt, fcntl.

UNIT-V

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.

Course Outcomes:

After the completion of this course the student should be able to

1. Understand and acquire knowledge in Linux environment and its different utilities.
2. Analyze the Environment, features and working of the Bourne Again SHell (BASH) a command language interpreter.
3. Identify the different concepts of Files, Directory ,Process and Kernel Support for them .
4. Demonstrate Inter Process Communication IPC between processes and FIFO's creation.
5. Comparing UNIX system versus Application Program Interfaces for semaphores.
6. Experiment with Network Programming in Java for the concepts of
    - Single and multiple connections (using multithreaded server)
    - Remote Method Invocation (Java RMI)-Basic RMI Process Application.

TEXT BOOKS:

1. Unix System Programming using C++, T.Chan, PHI.(Units II,III,IV)
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.(Unit I)
3. An Introduction to Network Programming with Java, Jan Graba, Springer, 2010.(Unit V)
4. Unix Network Programming ,W.R. Stevens, PHI.(Units II,III,IV)
5. Java Network Programming,3rd edition, E.R. Harold, SPD, O'Reilly.(Unit V)

REFERENCES:

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. C Programming Language, Kernighan and Ritchie, PHI

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VAAGDEVI COLLEGE OF ENGINEERING
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(M18CN01) TCP/IP PROTOCOL SUITE
(PROGRAM ELECTIVE-I)

M.Tech: I-Semester **L/T/P C**
3/0/- 3

Objectives:

- To Describe how the TCP/IP protocol suite works.
- To Describe the functions of static and dynamic IP addresses.
- To explain the major functions of networks with the OSI seven-layer model.
- To Describe the major functions of networks with the TCP/IP model

UNIT - I
Introduction to TCP/IP, The OSI Model and TCP/IP Protocol Suites, Underlying Technologies; IP Addressing, Sub netting and Super netting, CIDR, Delivery and Routing of IP Packets

UNIT - II
Internet Protocol (IP), ARP and RARP, Internet Control Message Protocol (ICMP), Internet Group Management Protocol (IGMP)

UNIT - III
User Datagram Protocol (UDP), Transmission Control Protocol (TCP) ; Routing Protocols (RIP, OSPF, HELLO and BGP)

UNIT - IV
Application Layer and Client-Server Model, BOOTP and DHCP; Domain Name System (DNS), Telnet and Rlogin

UNIT - V
File Transfer Protocol (FTP), Trivial File Transfer Protocol (SMTP), Simple Network Management Protocol (SNMP), Hyper Text Transfer Protocol (HTTP)

Course Outcomes:
After the completion of this course the student should be able to

1. Identify and differentiate the various TCP/IP protocol suites and explore the OSI Model.
2. Understand the major technologies like IP Addressing, Sub netting , Super netting and Routing of IP Packets.
3. Analyze the functionalities of various protocols like
    a. Internet Protocol (IP), Internet Control Message Protocol (ICMP), Internet Group Management Protocol (IGMP)
    b. User Datagram Protocol (UDP), Transmission Control Protocol (TCP) ; Routing Protocols (RIP)
4. Illustrate the importance of network models like Application Layer and Client-Server Model.
5. Differentiate between Rlogin and Telnet protocols for remote connections and execution of commands.
6. Summarize the different File Transfer Protocols.

TEXT BOOKS:
1. “Internetworking with TCP/IP, Principles, Protocols and Architectures”, Vol. I,

Douglas E.Comer, Fourth Edition, PHI.
2. "TCP/IP Protocol Suite", Forouzan BA, TMH (2000)

REFERENCE BOOK:

1. TCP/IP Unleashed, Pearson Education.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN02) ANDROID APPLICATION DEVELOPMENT
(PROGRAM ELECTIVE-I)

M.Tech: I-Semester **L/T/P C**
3/0/- 3

Objectives:

- To demonstrate their understanding of the fundamentals of Android operating systems.
- To demonstrate their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

UNIT I:

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Eclipse platform, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT II:

Android User Interface: Measurements – Device and pixel density independent measuring units Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT III

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and deleting data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

UNIT V

Advanced Topics: Alarms – Creating and using alarms Using Internet Resources – Connecting to internet resource, using download manager Location Based Services – Finding Current Location and showing location on the Map, updating location

Course Outcomes:

After the completion of this course the student should be able to

1. Understand the basics of Android Operating Systems and applicable devices.
2. Demonstrate Android Operating System development framework and life cycle of Android Applications.
3. Analyze the various components, layouts, fragments and Activities of an Android User Interface.
4. Perform Experiments on
    a. Using intents to launch Activities, dial a number or to send SMS.
    b. Creating and Displaying notifications, Toasts.
5. Make use of SQLite (Android built in database implementation) to perform different operations like insert, delete, retrieve and update on databases.
6. Gain a complete knowledge on advanced concepts like creating and using of alarms, finding and showing locations on maps and updating location.

TEXT BOOKS:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) , 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

REFERENCE:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CS03) INTERNET OF THINGS (IoT)
(PROGRAM ELECTIVE-I)

M.Tech: I-Semester (CNIS) **L/T/P C**
3/0/- 3

Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web based services on IoT devices

UNIT-I:
Introduction to Internet of Things –Definition and Characteristics of IoT , Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT-II:
IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- ETCONF, YANG, SNMP NETOPEER

UNIT-III:
Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML , HTTPLib , URLLib , SMTPLib .

UNIT-IV:
IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C)
Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT-V:
IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Web server – Web server for IoT, Cloud for IoT, Python web application framework Designing a REST ful web API .

Course Outcomes:

After the completion of this course the student should be able to

1. Describe the basic terminology, latest technology along with its applications.
2. Discuss the protocols based on the concepts such as machine to machine.
3. Illustrate the IOT devices using Python Scripting Language.
4. Develop an application with Raspberry PI platform which can be widely used in many applications of IoT devices.
5. Implement it widely that can be used in many applications of IoT devices.
6. Design a web application framework on REST ful web API.

TEX T BOOKs:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti,Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richardo. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley &Sons Inc., 2001.
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
4. Machine Learning by Peter Flach , Cambridge.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN03) ETHICAL HACKING
(PROGRAM ELECTIVE-II)

M.Tech: I-Semester **L/T/P C**
3/0/- 3

Course Objectives:

- The aim of the course is to introduce the methodologies and framework of ethical hacking for enhancing the security.
- The course includes-Impacts of Hacking; Types of Hackers; Information Security Models;Information Security Program; Business Perspective; Planning a Controlled Attack; Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration)

UNIT-I:
Introduction: Hacking Impacts, The Hacker **Framework:** Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration **Information Security Models:** Computer Security, Network Security, Service Security, Application Security, Security Architecture **Information Security Program**: The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking

UNIT-II:
The Business Perspective: Business Objectives, Security Policy, Previous Test Results, Business Challenges **Planning for a Controlled Attack**: Inherent Limitations, Imposed Limitations, Timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, Law Enforcement

UNIT-III:
Preparing for a Hack: Technical Preparation, Managing the Engagement **Reconnaissance**: Social Engineering, Physical Security, Internet Reconnaissance

UNIT-IV:
Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase **Exploitation:** Intutive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, RootKits, applications, Wardialing, Network, Services and Areas of Concern

UNIT-V:
Deliverable: The Deliverable, The Document, Overal Structure, Aligning Findings, Presentation **Integration:** Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy, Conclusion

Course Outcomes:
After the completion of this course the student should be able to

1. Gain Knowledge on Hacking Impacts, Hacker Framework and Vulnerability Analysis.
2. Understand the different Information Security Models and Information Security programs.
3. Analyze the system level and network level vulnerabilities which give a scope for hacking
4. Develop techniques to solve the security risks that may arise due to hacking.
5. Identify the appropriate technique of Ethical Hacking to solve any given security problem.

6. Perform a research on solving security problems at system level and network level.

TEXT BOOK

1. James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing", Auerbach Publications, CRC Press

REFERENCE BOOKS

1. EC-Council, "Ethical Hacking and Countermeasures Attack Phases", Cengage Learning
2. Michael Simpson, Kent Backman, James Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learning

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN04) SECURE SOFTWARE DESIGN
(PROGRAM ELECTIVE-II)

M.Tech: I-Semester **L/T/P C**
3/0/- 3

Objectives:

- Students will demonstrate knowledge of the distinction between critical and non-critical systems.
- Students will demonstrate the ability to manage a project including planning, scheduling and risk assessment/management.
- Students will author a software requirements document.
- Students will demonstrate an understanding of the proper contents of a software requirements document.
- Students will author a formal specification for a software system. • Students will demonstrate an understanding of distributed system architectures and application architectures.
- Students will demonstrate an understanding of the differences between real-time and non-real time systems.
- Students will demonstrate proficiency in rapid software development techniques.
- Students will be able to identify specific components of a software design that can be targeted for reuse.
- Students will demonstrate proficiency in software development cost estimation.
- Students will author a software testing plan.

UNIT-I:
Security a software Issue: introduction, the problem, Software Assurance and Software Security, Threats to software security, Sources of software insecurity, Benefits of Detecting Software Security **What Makes Software Secure:** Properties of Secure Software, Influencing the security properties of software, Asserting and specifying the desired security properties.

UNIT-II:
Requirements Engineering for secure software: Introduction, the SQUARE process Model, Requirements elicitation and prioritization.

UNIT-III:
Secure Software Architecture and Design: Introduction, software security practices for architecture and design: architectural risk analysis, software security knowledge for architecture and design: security principles, security guidelines and attack patterns
Secure coding and Testing: Code analysis, Software Security testing, Security testing considerations throughput the SDLC.

UNIT-IV:
Security and Complexity: System Assembly Challenges: introduction, security failures, functional and attacker perspectives for security analysis, system complexity drivers and security

UNIT-V:
Governance and Managing for More Secure Software: Governance and security, Adopting an enterprise software security framework, How much security is enough?, Security and project management, Maturity of Practice.

Course Outcomes:

After the completion of this course the student should be able to

1. Understand the different threats to software security, Sources of software insecurity, and Benefits of Detecting Software Security.
2. Acquire Knowledge on Requirements Engineering for secure software.
3. Analyze the Architecture and Design principles, guidelines of Secure Software **.**
4. Implement the coding and testing for software security
5. Interpret the System Assembly Challenges like attacker perspectives for security and failures.
6. Summarize the security requirements to decide which enterprise software security framework can be adopted.

TEXT BOOKS:

1. Software Security Engineering: Julia H. Allen, Pearson Education

REFERNCES:

1. Developing Secure Software: Jason Grembi, Cengage Learning
2. Software Security : Richard Sinn, Cengage Learning

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN05) DISTRIBUTED SYSTEM SECURITY
(PROGRAM ELECTIVE-II)

M.Tech: I-Semester **L/T/P C**
3/0/- 3

Objectives:

- To explain what a distributed system is, why you would design a system as a distributed system, and what the desired properties of such systems are;
- To list the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions;
- To recognize how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems.
- To design a distributed system that fulfills requirements with regards to key distributed Systems properties (such as scalability, transparency, etc.), be able to recognize when this is not possible, and explain why;
- To build distributed system software using basic OS mechanisms as well as higher -level middleware and languages.

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.500 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, Ocean Store. 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. 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.

Course Outcomes:

After the completion of this course the student should be able to

1. Compare the benefits of centralized system versus distributed systems and define the Architectural requirements for distributed environment.
2. Formulate a case study on Inter Process Communication using Java RMI
3. Demonstrate practically how to establish a simple distributed system
4. Analyze the concepts of Operating system architecture, File Service architecture, Name Services and the Domain Name System.
5. Classify the cryptographic algorithms and identify which suits best for securing the distributed system.
6. Design case study on Global Name Service, X.500 Directory Service and 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.
5. 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, Cambrigde, rp 2010

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18MC01) RESEARCH METHODOLOGY
(AUDIT COURSE)

M.Tech: I-Semester **L/T/P C**
2/0/- 2

Course Objectives:

- To develop an understanding of IPR/ research methodology in the process of creation of patents through research.
- To develop further research capabilities.
- To learn better report writing skills and Patenting.

UNIT-I:
RESEARCH METHODOLOGY: Objectives and Motivation of Research, Significance of Literature review, Types of Research, Research Approaches, and Research Methods verses Methodology, Research and Scientific Method, Importance of Research Methodology, Research Process, Criteria of Good Research.

UNIT-II:
RESEARCH DESIGN: Meaning of Research Design, Need of Research Design, Feature of a Good Design Important Concepts Related to Research Design, Different Research Designs, Basic Principles of Experimental Design, Data collection methods, Collection of primary data, Secondary data, Data organization, Methods of data grouping, Diagrammatic representation of data, Graphic representation of data.

UNIT-III:
RESEARCH REPORT WRITING: Format of the Research report, Synopsis, Dissertation, References/Bibliography/ Webliography, Research Proposal Preparation: Writing a Research Proposal and Research Report, Writing Research Grant Proposal.

UNIT-IV:
NATURE OF INTELLECTUAL PROPERTY: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development.

UNIT-V:
PATENT RIGHTS: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. New Developments in IPR: Administration of Patent System.

Course Outcomes:
After the completion of this course the student should be able to

1. Acquire knowledge on Research Design and statistical methods in research.
2. Analyze the various methods in Data Collection, Data Organization and different approaches of Data Representation.
3. Understand all the basic concepts required to prepare
    a. Research synopsis
    b. Dissertation
    c. Writing a good research proposal
4. Interpret the Scope of Patent Rights and Administration of Patent System.

TEXT BOOKS:

1. C.R Kothari, "Research Methodology, Methods & Technique".New Age International Publishers, 2004.
2. R. Ganesan, "Research Methodology for Engineers", MJP Publishers, 2011.
3. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", Aspen Publishers, 2016.
4. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008.
5. Satarkar, S.V,."Intellectual property rights and copy right". ESS Publications, 2000.

REFERENCES:

1. Ranjit Kumar, "Research Methodology: A Step by Step Guide for beginners", SAGE Publications Ltd.
2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)
(M18AC01) ENGLISH FOR RESEARCH PAPER WRITING
(AUDIT COURSE)

M.Tech: I-Semester **L/T/P C**
2/0/- 2

Course Objectives:

- To understand the nuances of language and vocabulary in writing a Research Paper.
- To develop the content, structure and format of writing a research paper.
- To give the practice of writinga Research Paper.
- To enable the students to evolve original research papers without subjected to plagiarism.

UNIT-I:
ACADEMIC WRITING: What is Research? - Meaning & Definition of a research paper– Purpose of a research paper – Scope – Benefits – Limitations – outcomes.

UNIT-II:
RESEARCH FORMAT: Title – Abstract – Introduction – Discussion - Findings – Conclusion – Style of Indentation – Font size/Font types – Indexing – Citation of sources.

UNIT-III:
RESEARCH METHODOLOGY: Methods (Qualitative – Quantitative) – Literature Review – Who did what – Criticizing, Paraphrasing & Plagiarism.

UNIT-IV:
PROCESS OF WRITING A RESEARCH PAPER: Choosing a topic - Thesis Statement – Outline – Organizing notes - Language of Research – Word order, Paragraphs – Writing first draft – Revising/Editing - Typing the final draft

UNIT-V:
HOW TO & WHERE TO GET PUBLISHED: Reputed Journals – National/International – ISSN No, No. of volumes, Scopes Index/UGC Journals – Freepublications - Paid Journal publications – /Advantages/Benefits

Course Outcomes:

After the completion of this course the student should be able to

1. Obtain complete knowledge on Definition of a research paper, Purpose of writing any research paper , its Scope and Benefits.
2. Understand the standard English formats .for scripting the best research paper.
3. Analyze all the Qualitative and Quantitative Research Methodologies and the ethics of plagiarism.
4. Explain the detailed process of writing and publishing any research paper and perform a case study on paper writing.

TEXT BOOKS:

1. MLA Hand book for writers of Research Papers, East West Press Pvt. Ltd, New Delhi, 7th Edition.
2. C. R Kothari, Gaurav, Garg, Research Methodology Methods and Techniques, New Age International Publishers. 4th Edition.
3. Lauri Rozakis, Schaum's Quick Guide to Writing Great Research Papers, Tata McGraw Hills Pvt. Ltd, New Delhi.
4. N. Gurumani, Scientific Thesis Writing and Paper Presentation, MJP Publishers

REFERENCES:

1. NPTEL: https://onlinecourses.nptel.ac.in/noc18_mg13/preview

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN06) COMPUTER NETWORKS AND NETWORK PROGRAMMING LAB
(LABORATORY-I)

M.Tech: I-Semester **L/T/P/ C**
-/- / 4/ 2

Objectives:

- To gain hands-on experiences in installing and administering computer systems and networks, in particular, the UNIX version.
- To implement networking and Internet protocols via programming and TCP/IP protocol architecture; user datagram protocol.
- To implement shell script that accepts a list of files.

LIST OF SAMPLE PROBLEMS/EXPERIMENTS:

Week-1:

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

Week-2:

5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
6. Write a shell script that accepts any number of arguments and prints them in the reverse order.
7. Write a shell script that determines the period for which a specified user is working on the system.
8. Write a shell script to list all of directory files in a directory.
9. Write an interactive file-handling shell program- Let it offer the user the choice of copying, removing or linking files. Once the user has made a choice, have the program ask him for the necessary information such as the file name, new name and so on.

Week-3:

10. Write a shell script to find factorial of a given integer.
11. Write a shell script to find the G.C.D. of two integers
12. Write a shell script to generate a multiplication table
13. Write a shell script that copies multiple files to a directory.
14. Write a shell script that counts the number of lines and words present in a given file.
15. Write a shell script that displays the list of all files in the given directory.
16. Write a shell script (small calculator) that adds, subtracts, multiplies and divides the given two integers. There are two division options: one returns the quotient and the other returns reminder. The script requires 3 arguments: The operation to be used and two integer numbers. The options are add (-a), subtract (-s), multiply (-m), quotient (-c) and reminder (-r).

Week-4:

17. Write a shell script to reverse the rows and columns of a matrix.
18. Write a sed command that deletes the first character in each line in a file.
19. Write sed command that deletes the character before the last character in each line file.
20. Write a sed command that swaps the first and second words in each line of a file.
21. Write an awk script that reads a file of which each line has 5 fields – ID, NAME, MARKS1, MARKS2, MARKS3 and finds out the average for each student. Print out the average marks with appropriate messages.

Week-5:

22. Write an awk script to find the factorial of a user supplied number.
23. ls –l command produces long listing of files.
24. Write an awk script 1) to print the selected fields (Ex: size and name of the files) from the file listing.
25. To print the size of all files and number of files.
26. Write an awk script to count the number of lines in a file that do not contain vowels.
27. Write an awk script to find the number of characters, words and lines in a file.
28. Write a c program that makes a copy of a file using a. Standard I/O b. System calls.

Week-6:

29. Write a C program that counts the number of blanks in a text file a. Using standard I/O b. Using system calls
30. Implement in C the following UNIX commands using system calls a. cat b. ls c. mv
31. Write a program that takes one or more file/directory names as command line input and reports the following information on the file.
32. File type.
33. Number of links.
34. Time of last access.

Week-7:

35. 1) Read, Write and Execute permissions.
    2) Write a c program to emulate the UNIX ls –l command.
    3) Write a c program that creates a directory, puts a file into it, and then removes it.
    4) Write a c program that searches for a file in a directory and reports whether the file is present in the directory or not.
36. Write a c program to list for every file in a directory, its inode number and file name.

Week-8:

37. Write a c program that creates a file containing hole which is occupying some space but having nothing.
38. Write a c program that demonstrates redirection of standard output to a file. Ex: ls > f1.
39. Write a c program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.
40. Write a c program to create a Zombie process.

Week-9:

41. Write a c program that illustrates how an orphan is created.
42. Write a c program that creates a child process to execute a command. The command to be executed is passed on the command line.

43. Write a c program that accepts two small numbers as arguments and then sums the two numbers in a child process. The sum should be returned by child to the parent as its exit status and the parent should print the sum.
44. Write a c program that illustrates how to execute two commands concurrently with a command pipe. Ex:- ls –l | sort.
45. Write c programs that illustrate communication between two unrelated processes using named pipe.

Week-10:

46. Write a c program in which a parent writes a message to a pipe and the child reads the message.
47. Write a c program that illustrates suspending and resuming processes using signals.
48. Write a c program that displays the real time of a day every 60 seconds, 10 times.
49. Write a c program that runs a command that is input by the user and prints the exit status if the command completes in 5 seconds. If it doesn't, then the parent uses kill to send a SIGTERM signal to kill the child process.
50. Write a C program that illustrates file-locking using semaphores.

Week-11:

51. Write a C program that implements a producer-consumer system with two processes. (Using semaphores).
52. Write client and server programs (using C) for Interaction between server and client processes using Unix Domain Sockets. Interaction between server and client processes using Internet Domain Sockets.

Week-12:

53. Write a C program (sender.c)
54. To create a message queue with read and write permissions.
55. To write 3 messages to it with different priority numbers.
    a. Write a C program (receiver.c) that receives the messages (from the above message queue as specified in 63.a) and displays them.
    b. Write C program that illustrates two processes communicating via shared memory.
    c. Design TCP iterative Client and server application to reverse the given input sentence
    d. Design TCP client and server application to transfer file

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Course Outcomes:

After the completion of this course the student should be able to

1. Understand using shell scripts and apply for interactive file-handling shell program
2. Make use of shell scripts for writing code for all basic programs like finding GCD, Factorial, generate multiplication table and design simple calculator.
3. Practice Implementing UNIX commands using system calls in C .
4. Develop client server programming in C using Unix Domain Sockets.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN07) INTERNET OF THINGS LAB
(LABORATORY-II)

M.Tech: I-Semester **L/T/P/ C**
-/- / 4/ 2

Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web based services on IoT devices

Week-1:
Start Raspberry Pi and try various Linux commands in command terminal window:
ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.

Week-2:
Run some python programs on Pi like:

a) Read your name and print Hello message with name
b) Read two numbers and print their sum, difference, product and division.
c) Word and character count of a given string
d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input Print a name 'n' times, where name and n are read from standard input, using for and while loops.
e) Handle Divided by Zero Exception.
f) Print current time for 10 times with an interval of 10 seconds.
g) Read a file line by line and print the word count of each line.

Week-3:
Light an LED through Python program

Week-4:
Get input from two switches and switch on corresponding LEDs

Week-5:
Flash an LED at a given on time and off time cycle, where the two times are taken from a file.

Week-6:
Flash an LED based on cron output (acts as an alarm)

Week-7:
Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.

Week-8:
Access an image through a Pi web cam.

Week-9:

Control a light source using web page.

Week-10:
Implement an intruder system that sends an alert to the given email.

Week-11:
Get the status of a bulb at a remote place (on the LAN) through web.

Week-12:
Get an alarm from a remote area (through LAN) if smoke is detected. The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

Course Outcomes:
After the completion of this course the student should be able to

1. Demonstrate the starting of Raspberry Pi and practice Linux commands in command terminal window.
2. Develop and run all basic python programs on Raspberry Pi
3. Build real time applications on Light an LED using Python programming
4. Experiment with implementation of intruder system and various sensors like temperature, humidity, smoke.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN08) NETWORK SECURITY
(CORE COURSE-IV)

M.Tech: II Semester **L/T/P C**
3/0/- 3

Objectives:

- To enable students to learn the various security standards set by the global industry.
- The various security applications that are used by industry.

UNIT-I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT-II

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

UNIT-III

Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

UNIT-IV

Email privacy: Pretty Good Privacy (PGP) and S/MIME.IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT-V

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats. Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

Course Outcomes:

After the completion of this course the student should be able to

1. Gain a complete knowledge on types of security attacks, services and mechanisms.
2. Understand the implementation of Internetwork security model and its standards and vulnerabilities.
3. Demonstrate the Conventional Encryption Principles and the Public key cryptography principles
4. Take up projects on Email privacy system and compare Pretty Good Privacy (PGP) and S/MIME.
5. Build a model of Firewall and test the security issues
6. Identify the vulnerable points for attacks in simple networks.

TEXT BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.
2. Network Security - Private Communication in a Public World by CharlienKaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. Principles of Information Security, Whitman, Cengage Learning.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN09) WIRELESS NETWORKS
(CORE COURSE – V)

M.Tech:II-Semester **L/T/P C**
3/0/- 3

Objectives:

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications.

UNIT-I:
WIRELESS LANS, PANS AND MANS Introduction, fundamentals of WLAN – technical issues, network architecture, IEEE 802.11- physical layer, Mac layer mechanism, CSMA/CA, Bluetooth-specification, transport layer, middleware protocol group, Bluetooth profiles, WLL –generic WLL architecture, technologies, broadband wireless access, IEEE 802.16 –differences between IEEE 802.11 and 802.16,physical layer, data link layer.

UNIT-II:
WIRELESS INTERNET : Introduction –wireless internet, address mobility, inefficiency of transport layer and application layer protocol, mobile IP – simultaneous binding, route optimization, mobile IP variations, handoffs, IPv6 advancements, IP for wireless domain, security in mobile IP, TCP in wireless domain – TCP over wireless , TCPs -traditional, snoop, indirect, mobile, transaction- oriented, impact of mobility.

UNIT-III:
AD-HOC WIRELESS NETWORK AND WIRELESS SENSOR NETWORK : Introduction, issues – medium access scheme, routing, multicasting, transport layer protocol, pricing scheme, QoS provisioning, self-organization, security, addressing, service discovery, energy management, deployment consideration, ad-hoc wireless internet.

UNIT-IV:
WIRELESS SENSOR NETWORK Introduction – applications of sensor network, comparisons with MANET, issues and design challenges, architecture – layered and clustered , data dissemination, data gathering, Mac protocols, location discovery, quality of sensor network – coverage and exposure, zigbee standard.

UNIT-V:
RECENT ADVANCES IN WIRELESS NETWORK :UWB radio communication- operation of UWB systems, comparisons with other technologies, major issues, advantages and disadvantages, wi-fi systems- service provider models, issues, interoperability of wi-fi and WWAN, multimode 802.11 – IEEE 802.11a/b/g – software radio-based multimode system, meghadoot architecture -802.11 phone, fundamentals of UMTS.

Course Outcomes:
After the completion of this course the student should be able to

1. Identify the importance and advantage of a wireless network over the wired network
2. Understand the architecture and different layers of wireless Local Area Network(LAN), PAN's and MAN's.
3. Acquire knowledge in physical, data link ,network and transport layer of wireless internet networking models.

4. Classify the network and routing protocols for AD-HOC Wireless Network
5. Compare the applications of wireless sensor networks with MANET with respect to design challenges.
6. Discover all the Recent Advances In Wireless Network

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012.(Unit I,II,III)
2. Vijay Garg , "Wireless Communications and networking", First Edition, Elsevier 2007.(Unit IV,V)

REFERENCES:

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
3. Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education 2013

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN10) DIGITAL WATERMARKING AND STEGANOGRAPHY
(PROGRAM ELECTIVE-III)

M.Tech: III-Semester (CNIS) **L/T/P C**
3/0/- 3

Course Objectives:

- To learn about the watermarking models and message coding
- To learn about watermark security and authentication.
- To learn about Steganography. Perceptual models

UNIT-I:
INTRODUCTION: Information Hiding, Steganography and Watermarking – History of watermarking – Importance of digital watermarking – Applications – Properties – Evaluating watermarking systems. **WATERMARKING MODELS & MESSAGE CODING:** Notation – Communications – Communication based models – Geometric models – Mapping messages into message vectors – Error correction coding – Detecting multi-symbol watermarks.

UNIT-II:
WATERMARKING WITH SIDE INFORMATION & ANALYZING ERRORS: Informed Embedding – Informed Coding – Structured dirty-paper codes - Message errors – False positive errors – False negative errors – ROC curves – Effect of whitening on error rates.

UNIT-III:
PERCEPTUAL MODELS: Evaluating perceptual impact – General form of a perceptual model – Examples of perceptual models – Robust watermarking approaches - Redundant Embedding, Spread Spectrum Coding, Embedding in Perceptually significant coefficients.

UNIT-IV:
WATERMARK SECURITY & AUTHENTICATION: Security requirements – Watermark security and cryptography – Attacks – Exact authentication – Selective authentication – Localization – Restoration.

UNIT-V:
STEGANOGRAPHY: Steganography communication – Notation and terminology – Information theoretic foundations of steganography – Practical steganographic methods – Minimizing the embedding impact – Steganalysis.

Course Outcomes:
After the completion of this course the student should be able to

1. Understand the importance of information hiding and analyze the methods of steganography and watermarking.
2. Explain the different watermarking models and how they can be used for message coding.
3. Identify the method of Watermarking With Side Information & how errors are analyzed using the method.
4. Classify the Perceptual Models and compare the Robust watermarking approaches.
5. Determine the various Security & Authentication issues related to watermarking model.
6. Understand the different steganography techniques and their applications for information security.

TEXT BOOK:

1. "Digital Watermarking and Steganography" Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, Second Edition, Margan Kaufmann Publishers, New York, 2008.

REFERENCES:

1. Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, "Techniques and Applications of Digital Watermarking and Contest Protection", Artech House, London, 2003.
2. Juergen Seits, "Digital Watermarking for Digital Media", IDEA Group Publisher, New York, 2005.
3. Peter Wayner, "Disappearing Cryptography – Information Hiding: Steganography & Watermarking", Morgan Kaufmann Publishers, New York, 2002.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN11) SECURITY THREATS
(PROGRAM ELECTIVE-III)

M.Tech: II-Semester **L/T/P C**
3/0/- 3

Course Objectives:
The main objective of this course is that to provide security to various systems by identifying various Types of threats and vulnerabilities.

UNIT-I:
Introduction: Security threats - Sources of security threats- Motives-Target Assets and Vulnerabilities. Consequences of threats- E-mail threats –Web-threats -Intruders and Hackers, Insider threats, Cyber crimes.

UNIT-II:
Network Threats: Active/ Passive – Interference – Interception – Impersonation – Worms – Virus – Spam's – Ad ware - Spy ware – Trojans and covert channels –Backdoors – Bots – IPSpoofing – ARP spoofing - Session Hijacking - Sabotage-Internal treats-
Environmental threats -Threats to Server security.

UNIT-III:
Security Threat Management: Risk Assessment - Forensic Analysis - Security threat correlation – Threat awareness - Vulnerability sources and assessment-Vulnerability assessment tools - Threat identification - Threat Analysis - Threat Modeling - Model for Information Security Planning.

UNIT-IV:
Security Elements: Authorization and Authentication - types, policies and techniques – Security certification - Security monitoring and Auditing - Security Requirements Specifications - Security Policies and Procedures, Firewalls, IDS, Log Files, Honey Pots

UNIT-V:
Access control, Trusted Computing and multilevel security – Security models, Trusted Systems, Software security issues, Physical and infrastructure security, Human factors – Security awareness, training, Email and Internet use policies.

Course Outcomes:
After the completion of this course the student should be able to

1. Gain a complete knowledge on Sources of security threats, vulnerabilities and consequences of threats.
2. Identify system level, network level and server level security threats.
3. Understand the threats on internet like Email threats, Web threats and how they lead to cyber crime.
4. Perform analysis on Vulnerability sources and assessment tools under Security Threat Management.
5. Interpret the several Authorization and Authentication methods like Firewalls, IDS, Log Files, Honey Pots to handle security threats.
6. Classify the different security models, trusted systems for physical and infra structure security.

TEXT BOOKS:

1. Swiderski, Frank and Syndex: "Threat Modeling", 1st Edition, Microsoft Press, 2004.
2. Joseph M Kizza: "Computer Network Security", 1st Edition, Springer, 2010.
3. William Stallings and Lawrie Brown: "Computer Security: Principles and Practice", 2nd Edition Prentice Hall, 2008.

REFERENCES:

1. Lawrence J Fennelly : "Handbook of Loss Prevention and Crime Prevention" 5th Edition, Butterworth-Heinemann,2012.
2. Tipton RuthbeRg : "Handbook of Information Security Management", 6th Edition, Auerbach Publications,2010.
3. Mark Egan : "The Executive Guide to Information Security" , 1st Edition, Addison-Wesley Professional,2004.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN12) CYBER SECURITY
(PROGRAM ELECTIVE-III)

M.Tech: II-Semester **L/T/P C**
3/0/- 3

Course Objective:
Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications. Gain familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath

UNIT-I:
Introduction: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT-II :
Conventional Encryption: Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT-III :
Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT-IV :
IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET) Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT-V:
Intrusion Detection: Intruders, Intrusion Detection systems, Password Management. Malicious Software: Viruses and related threats & Countermeasures. Fire walls: Firewall Design principles, Trusted Systems.

Course Outcomes:
After the completion of this course the student should be able to

1. Understand the different kinds of security attacks, services and mechanisms.
2. Define a internetwork security model and identify the TCP, UDP session hijacking.
3. Identify and classify the different types of attacks and suggest appropriate conventional encryption algorithms to be applied.
4. Gain complete knowledge in number system and areas of applications in public key cryptography algorithms.
5. Interpret the importance of digital signatures, digital Certificates, Certificate Authority for electronic document transfer on internet.

6. Demonstrate IP security architecture and explain how Pretty Good Privacy (PGP) and S/MIME provides Email privacy.

TEXT BOOKS:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage,2010

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN13) BIOMETRICS
(PROGRAM ELECTIVE-IV

M.Tech: II-Semester **L/T/P C**
3/0/- 3

Objectives:

- To learn the biometric technologies.
- To learn the computational methods involved in the biometric systems.
- To learn methods for evaluation of the reliability and quality of the biometric systems.

UNIT-I:
INTRODUCTION & HANDWRITTEN CHARACTER RECOGNITION
Introduction – history – type of Biometrics – General Architecture of Biometric Systems – Basic Working of biometric Matching – Biometric System Error and performance Measures– Design of Biometric Systems – Applications of Biometrics – Benefits of Biometrics Versus Traditional Authentication Methods – character Recognition – System Overview – Geature Extraction for character Recognition – Neural; Network for handwritten Character Recognition – Multilayer Neural Network for Handwritten Character Recognition – Devanagari Numeral Recognition – Isolated Handwritten Devanagari Character Recognition suing Fourier Descriptor and Hidden markov Model.

UNIT-II:
FACE BIOMETRICS & RETINA AND IRIS BIOMETRICS
Introduction –Background of Face Recognition – Design of Face Recognition System – Neural Network for Face Recognition – Face Detection in Video Sequences – Challenges in Face Biometrics – Face Recognition Methods – Advantages and Disadvantages – Performance of Biometrics – Design of Retina Biometrics – Iris Segmentation Method – Determination of Iris Region – Experimental Results of Iris Localization – Applications of Iris Biometrics – Advantages and Disadvantages. VEIN AND FINGERPRINT BIOMETRICS & BIOMETRIC HAND GESTURE RECOGNITION FOR INDIAN SIGN LANGUAGE. Biometrics Using Vein Pattern of Palm – Fingerprint Biometrics – Fingerprint Recognition System – Minutiae Extraction – Fingerprint Indexing – Experimental Results – Advantages and Disadvantages – Basics of Hand Geometry – Sign Language – Indian Sign Language – SIFT Algorithms-Practical Approach Advantages and Disadvantages.

UNIT-III:
PRIVACY ENHANCEMENT USING BIOMETRICS & BIOMETRIC CRYPTOGRAPHY AND MULTIMODAL BIOMETRICS
Introduction – Privacy Concerns Associated with Biometric Developments – Identity and Privacy – Privacy Concerns – Biometrics with Privacy Enhancement – Comparison of Various Biometrics in Terms of Privacy – Soft Biometrics - Introduction to Biometric Cryptography – General Purpose Cryptosystem – Modern Cryptography and Attacks – Symmetric Key Ciphers – Cryptographic Algorithms – Introduction to Multimodal Biometrics – Basic Architecture of Multimodal Biometrics – Multimodal Biometrics Using Face and Ear – Characteristics and Advantages of Multimodal Biometrics Characters – AADHAAR : An Application of Multimodal Biometrics.

UNIT-IV:
WATERMARKING TECHNIQUES & BIOMETRICS: SCOPE AND FUTURE
Introduction – Data Hiding Methods – Basic Framework of Watermarking – Classification of Watermarking – Applications of Watermarking – Attacks on Watermarks – Performance Evaluation – Characteristics of Watermarks – General Watermarking Process – Image Watermarking Techniques –

Watermarking Algorithm – Experimental Results– Effect of Attacks on Watermarking Techniques – Scope and Future Market of Biometrics – Biometric Technologies – Applications of Biometrics - Biometrics – and Information Technology Infrastructure – Role of Biometrics in Enterprise Security – Role of Biometrics in Border Security – Smart Card Technology and Biometric – Radio Frequency Identification Biometrics – DNA Biometrics – Comparative Study of Various Biometrics Techniques.

UNIT-V:
IMAGE ENHANCEMENT TECHNIQUES & BIOMETRICS STANDS
Introduction – current Research in image Enhancement Techniques – Image Enhancement – Frequency Domain Filters – Databases and Implementation – Standard Development Organizations – Application Programming Interface – Information Security and Biometric Standards – Biometric Template Interoperability.

Course Outcomes:
After the completion of this course the student should be able to

1. Understand the history, types, architecture and Applications of Biometric System.
2. Perform a comparative study on Benefits of Biometrics Versus Traditional Authentication Methods
3. Acquire advanced knowledge in Biological Biometrics like Face Recognition, Retina and Iris Biometrics.
4. Identify the advantages and disadvantages of Using Vein Pattern of Palm, Fingerprint biometrics and Hand Geometry.
5. Conduct a detailed survey on currently available biometric systems and Make a study on how Watermarking Techniques and Image Enhancement Techniques can be used in biometrics and identify the future scope.
6. Implement practically any one of the biometric authentication system and Explore the different cryptography techniques which can improve the working of biometric systems.

TEXT BOOK:

1. BIOMETRICS: CONCEPTS AND APPLICATIONS by G R SINHA and SANDEEP B. PATIL, Wiely, 2013.
2. Biometrics for Network Security – Paul Reid, Pearson Education.

REFERENCE BOOKS:

1. Biometrics – Identity verification in a networked world – Samir Nanavathi, Micheal Thieme, Raj Nanavathi, Wiley – dream Tech.
2. Biometrics – The Ultimate Reference – John D. Woodward, Jr.Wiley Dreamtech.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18CN14) IT SECURITY METRICS
(PROGRAM ELECTIVE-IV)

M.Tech: II Semester **L/T/P C**
3/0/- 3

Course Objectives:

- To understand about the data and security metrics and measurements of the data
- To know about the security operations, cost and values

UNIT-I:
What Is a **Security Metric?** Metric and Measurement, Security Metrics Today, The Dissatisfying State of Security Metrics, Reassessing Our Ideas About Security Metrics. **Designing Effective Security Metrics:** Choosing Good Metrics, GQM for Better Security Metrics, More Security Uses for GQM, Summary.

UNIT-II:
Understanding Data: What are Data? Data Sources for Security Metrics; We Have Metrics and Data - Now what, Summary, Case Study 1. **The Security Process Management** Framework: Managing Security as a Business Process, the SPM Framework, Before You Begin SPM, Summary. **The Analyzing Security Metrics Data:** The Most Important Step, Analysis Tools and Techniques, Summary. **Designing the Security Measurement Project:** Before the Project Begins, Phase One: Build a Project Plan and Assemble the Team, Phase two: Gather the Metrics Data, phase Three: Analyze the Metrics Data and Build Conclusions, phase Four: Present Results, Phase Five: Reuse the Results, Project Management Tools, Summary.

UNIT-III:
Measurements **Security Operations:** Sample Metrics for Security Operations, Sample Measurement Project for Security Operations, Summary. **Measuring Compliance and Conformance:** The Challenges of Measuring Compliance, Sample Measurement Projects for Compliance and Conformance, Summary.

UNIT-IV:
Measuring Security Cost and Value: Sample Measurement Projects for Compliance and Conformance, The Importance of Data to Measuring Cost and Value, Summary. **Measuring People, Organizations, and Culture:** Sample Measurement Projects for People, Organizations, and Culture, Summary.

UNIT-V:
The Security Improvement Program: Moving from Projects to Programs, Managing Security Measurement with a Security, Requirements for a SIP, Measuring the SIP. Summary. **Learning Security: Different Contexts for Security Process Management:** Organizational Learning, Three Learning Styles for IT Security Metrics, Final Thoughts, Summary.

Course Outcomes:
After the completion of this course the student should be able to

1. Acquire a complete understanding on all the currently available security metrics and their respective states.
2. Develop methods to design effective security metrics and determine if the metrics are good or not using the Goal-Question-Metric (GQM) paradigm.
3. Perform a case study on the five step process for Designing the Security Measurement Project.

4. Summarize the different security operations and process of Measuring Compliance and Conformance.
5. Identify the parameters for measuring the security cost and value.
6. Take up projects on security improvement programs and security process management.

Text Books:

1. IT SECURITY METRICS, Lance Hayden, TATA McGraw-HILL.
2. SECURITY METRICS, CAROLINE WONG, TATA McGraw-HILL.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M18CN15) SECURITY ASSESMENTAND RISK ANALYSIS
(PROGRAM ELECTIVE-IV)

M.Tech: II-Semester **L/T/P C**
3/-/- 3

OBJECTIVE:
To gain application ability of necessary controls, laws and standards in computerized Information system.

UNIT-I: Information Systems Concepts:
General Systems Concepts – Nature and types of systems, nature and types of information, attributes of information. Management Information System – Role of information within business Business information systems –various types of information systems – TPC, MIS, DSS, EIS, ES.

UNIT-II: Systems Development Life Cycle Methodology:
Introduction to SDLC/Basics of SDLC Requirements analysis and systems design techniques Strategic considerations: Acquisition decisions and approaches Software evaluation and selection/development Alternate development methodologies- RAD, Prototype etc Hardware evaluation and selection Systems operations and organization of systems resources Systems documentation and operation manuals User procedures, training and end user computing System testing, assessment, conversion and start-up Hardware contracts and software licenses System implementation Post-implementation review System maintenance System safeguards Brief note on IS Organization Structure

UNIT-III: Control objectives
Information Systems Controls Need for control Effect of computers on Internal Audit Responsibility for control – Management, IT, personnel, auditors Cost effectiveness of control procedure Control Objectives for Information and related Technology (COBIT) Information Systems Control Techniques Control Design: Preventive and detective controls, Computer-dependent control, Audit trails, User Controls (Control balancing, Manual follow up) Non-computer-dependent (user) controls: Error identification controls, Error investigation controls, Error correction controls, Processing recovery controls over system selection, acquisition/development Standards and controls applicable to IS development projects Developed / acquired systems Vendor evaluation Structured analysis and design Role of IS Auditor in System acquisition/selection

UNIT-IV: Audit Tests of General and Automated Controls
Introduction to basics of testing (reasons for testing); Various levels/types of testing such as: (i) Performance testing, (ii) Parallel testing, Concurrent Audit modules/Embedded audit modules, etc.

UNIT-V: Risk assessment methodologies and applications:
Meaning of Vulnerabilities, Threats, Risks, Controls, Fraud, error, vandalism, excessive costs, competitive disadvantage, business, interruption, social costs, statutory sanctions, etc. Risk Assessment and Risk Management, Preventive/detective/corrective strategies
Business Continuity Planning and Disaster recovery planning: Fundamentals of BCP/DRP, Threat and risk management, Software and data backup techniques,

Course Outcomes:
After the completion of this course the student should be able to
1. Understand the nature, types and attributes of information and its role in business information system.

2. Classify and differentiate between the working of different information systems like TPC, MIS, DSS, EIS, and ES.
3. Interpret all the phases of Systems Development Life Cycle and incorporate them in building a secure information system.
4. Gain a complete knowledge about COBIT (Control Objectives for Information and Related Technologies) framework for information technology (IT) management and IT governance.
5. Demonstrate performance and parallel testing on Concurrent Audit modules/Embedded audit modules of an information system.
6. Plan for a case study on different vulnerabilities to security and perform risk analysis for security assessment.

TEXT BOOK:

1. Information Systems Control and Audit- Board of Studies Institute of Chartered Accountants of India New Delhi.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M18AC02) STRESS MANAGEMENT
(AUDIT COURSE)

M.Tech: II-Semester **L/T/P C**
2/0/0 0

UNDERSTANDING STRESS Meaning – Symptoms – Work Related Stress – Individual Stress – Reducing Stress -sources of stress –consequence of stress-burnout-symptoms of Burnout- stress verses Burnout-model of stress-strategies for coping stress (individual and organizational strategies) –case study

TIME MANAGEMENT Techniques – Importance of Planning the day –developing concentration – Prioritizing Beginning at the start – Techniques for conquering procrastination – Sensible delegation – Taking the right breaks – Learning to say "No"

CAREER PLATEAU Career plateau – Identifying Career plateaus – Structural and Content - Plateauing – Making a fresh start – Importance of Sabbaticals – Counseling out – Executive leasing – Sustaining a marketable Career.

CRISIS MANAGEMENT Implications – People issues – Structure issues – Environmental issues – Learning to keep calm - Preventing interruptions – Controlling crisis – Pushing new ideas – Empowerment – Work place Humor, Developing a sense of Humor – Learning to laugh – role of group cohesion and team spirit.

SELF DEVELOPMENT Improving personality – Leading with Integrity – Enhancing Creativity – Effective decision making – Sensible Communication – The Listening Game – Managing Self – Mediation for peace – Yoga for Life.

Course Outcomes:
After the completion of this course, the students should be able to

1. Maintain a stress awareness log. Include identification of causes, symptoms, and analysis of effects.
2. Gather information on current stress management techniques and evaluate personal relevance.
3. Practice specific techniques, track effectiveness, and revise to meet personal preferences.
4. Create an adaptable stress management plan for academic success incorporating selected techniques.

TEXT BOOKS

1. Bhatia R.L., The Executive Track: An Action Plan for Self Development Wheeler Publishing.
2. Charavathy.S.K, "Human Values for Manager", McGraw Hill/HenelyManagement Series

REFERENCES

1. Jeffr Davison, Managing Stress, Prentice Hall of India, New Delhi
2. Jerrold S Greenberg, Comprehensive Stress Management, Jain Books, 2009

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M18CN16) NETWORK SECURITY LAB
(LABORATORY-III)

M.Tech: II-Semester **L/T/P C**
0/-/4 2

Course Objectives:
The objective of this course is that to understand the principles of encryption algorithms, conventional and public key cryptography practically with real time applications.

The following programs should be implemented preferably on platform Windows/Unix using C

Week-1:
Implement the encryption and decryption of 8-bit data using Simplified DES Algorithm (created by Prof. Edward Schaefer) in C

Week-2:
Write a program to break the above DES coding

Week-3:
Implement Linear Congruential Algorithm to generate 5 pseudorandom numbers in C

Week-4:
Implement the Euclid Algorithm to generate the GCD of an array of 10 integers in C

Week-5:
a) Implement RSA algorithm for encryption and decryption in C
b) In an RSA System, the public key of a given user is e=31,n=3599. Write a program to find private key of the User.

Week- 6:
Configure a mail agent to support Digital Certificates, send a mail and verify the correctness of this system using the configured parameters.

Week-7:
Configure SSH (Secure Shell) and send/receive a file on this connection to verify the correctness of this system using the configured parameters.

Week -8:
Configure S/MIME and show email-authentication.

Week- 9:
Implement encryption and decryption with openssl.

Week-10:
Working with Sniffers for monitoring network communication (Ethereal)

Course Outcomes:

After the completion of this course the student should be able to

1. Implement Simplified DES Algorithm for encryption and decryption and also check how to break the DES coding.
2. Apply the RSA the public key cryptography algorithm to transfer data securely across any network.
3. Verify the correctness of the Email system using digital signatures by using a mail agent and also verify email authentication using S/MIME.
4. Examine the working of Sniffers for network communication monitoring.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M18CN17) SECURITY THREATS LAB
(LABORATORY-IV)

M.Tech: II-Semester **L/T/P C**
0/4/- 2

List of Lab Programs

Week-1:
Study the Ettercap tool for network protocol analysis and security auditing.

Week-2:
Study OpenVAS an open source Vulnerability Assessment System that offers a selection of tools and services for vulnerability scanning and vulnerability management. The security scanner feeds off an online database of over 30,000 network vulnerability tests and is updated regularly.

Week-3:
Study Nmapfor tasks like monitoring host or service uptime, managing service upgrade schedules, and network inventory.

Week-4:
Study the working of Suricata for real time intrusion detection (IDS), inline intrusion prevention (IPS), and network security monitoring (NSM).

Week-5:
PfSense, is a free and open source distribution tool of FreeBSD designed to be used as a firewall and router. The software includes an easy-to-use Web interface. pfSense only provides the software component of the firewall, so if you choose to use it, you'll have to tailor the hardware to meet your needs.

Week-6:
Study Moloch, the open-source full-packet capturing, indexing, and database tool aims to extend existing security infrastructure by storing and indexing network traffic.

Week-7:
Study OSSIM, an Open Source Security Information and Event Management (SIEM).

Week-8:
StudyCuckooSandbox , a free malware analysis system designed to tear malware apart and discover actionable threat data based on what happens when it's executed in an isolated environment The tool analyzes several different types of malicious files and websites in Windows, OS X, Linux, and Android virtualized environments.

Week-9:
Study Metasploit ,a penetration testing software. It helps offensive security teams discover vulnerabilities through automated penetration tests, which are fueled by a continuously growing database of exploits

Week-10:
Study OpenVPN an open source SSL VPN tool that works in a wide range of configurations, including remote access, site-to-site VPNs, Wi-Fi security, and enterprise-scale remote access solutions. It offers load balancing, failover, and fine-grained access controls.

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Course Outcomes:

After the completion of this course the student should be able to

1. Understand and make use of tools like Ettercap tool for network protocol analysis and security auditing and Open Vulnerability Assessment System (VAS) for vulnerability scanning and management
2. Demonstrate the working of working of Suricata the real time intrusion detection, prevention and network security monitoring tool.
3. Analyze the working of OSSIM- Open Source Security Information and Event Management (SIEM).
4. Install and use Study Cuckoo Sandbox to classify different types of malicious files and websites in Windows, OS X, Lunix, and Android virtualized environments.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M18CN19) DATAWAREHOUSE AND DATAMINING
(Program Elective-V)

M.Tech: III Semester **L/T/P C**
3/-/- 3

Course Objectives:

To enable students to make more effective use of data stored in databases. To create a clean and consistent repository of data within a data warehouse. To utilize various levels and types of summarization of data to support management decision making. To discover patterns and knowledge that is embedded in the huge quantities of data records using different data mining techniques.

UNIT-I

Data Mining: Types of Data, Data Mining Functionalities, Interestingness Patterns-Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. Applications of Data mining.
Data Preprocessing: Data cleaning, Data integration and data transformation, data reduction: data cube aggregation, dimensionality reduction.

UNIT-II

Data Warehouse and OLAP Technology: Introduction to Data Warehouse, Differences between operational database systems and data warehouses (OLAP & OLTP),
Multidimensional Data Model: Data Warehouse Architecture, Data Cube and OLAP Technology, Data Warehouse Implementation.

UNIT-III

Association Rule Mining: Mining Frequent Patterns, Associations and Correlations, Mining Methods, Mining various kinds of Association Rules, Correlation Analysis, Constraint -based Association Mining

UNIT-IV

Classification and Prediction: Basic Concepts, Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction.

UNIT-V

Cluster Analysis: Types of Data in Cluster Analysis, Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

Course Outcomes:

After the completion of this course the student should be able to

1. Understand the need of Data warehouse for storage and data mining for knowledge discovery.
2. Explain the different data pre-processing methods and why they are necessary and how they improve the quality of data mining results.
3. Compare the functionalities of OLTP- On Line Analytical Processing and OLTP- On Line Transaction Processing and interpret the various multidimensional data models.
4. Gain knowledge on different data mining algorithms, Association rules, Classifications and prediction and cluster analysis.
5. Perform a case study on application of data mining algorithms on different kinds of data.
6. Apply appropriate data mining techniques to solve real world problems.

Text Books:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, Elsevier,2nd Edition, 2006.

Reference Books:

1. Data Mining Techniques – Arun K Pujari, 2nd edition, Universities Press.
2. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia.
3. Insight into Data Mining,K.P.Soman,S.Diwakar,V.Ajay,PHI,2008.
4. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition
5. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M18CN20) WEB SEARCH AND INFORMATION RETRIEVAL
(Program Elective-V)

M.Tech: III-Semester **L/T/P C**
3/-/- 3

Course Objectives:

To enable students to make more effective use of data stored in databases. To create a clean and consistent repository of data within a data warehouse. To utilize various levels and types of summarization of data to support management decision making. To discover patterns and knowledge that is embedded in the huge quantities of data records using different data mining techniques.

UNIT-I

Web Search and Information Retrieval: What Is Information Retrieval, The Big Issues, Search Engines, Search Engineers,

Architecture of a Search Engine : What Is an Architecture, Basic Building Blocks, Breaking It Down, Text Acquisition, Text Transformation, Index Creation, User Interaction, Ranking, Evaluation, How Does It Really Work?

UNIT-II

Crawls and Feeds: Crawls and Feeds, Deciding What to Search, Crawling the Web, Retrieving Web Pages, The Web Crawler, Freshness, Focused Crawling, Deep Web Sitemaps, Distributed Crawling, Crawling Documents and Email, Document Feeds, The Conversion Problem, Character Encodings, Storing the Documents, Using a Database System, Random Access, Compression and Large Files, Update, Bitable, Detecting Duplicates, **Removing Noise:** Removing Noise, Processing Text, From Words to Terms, Text Statistics, Vocabulary Growth, Estimating Collection and Result Set Sizes, Document Parsing, Overview, Tokenizing, Stopping, Stemming, Phrases and N-grams, Document Structure and Markup, Link Analysis, Anchor Text, Page Rank, Link Quality, Information Extraction, Hidden Markov Models for Extraction, Internationalization.

UNIT-III

Ranking with Indexes: Overview, Abstract Model of Ranking, Inverted, Indexes, Documents, Counts, Positions, Fields and Extents, Scores, Ordering, Compression, Entropy and Ambiguity, Delta Encoding, Bit-Aligned Codes, Byte-Aligned Codes, Compression in Practice, Looking Ahead, Skipping and Skip Pointers, Auxiliary Structures, Index Construction, Simple Construction, Merging, Parallelism and Distribution, Update, Query Processing, Document-at-a-time Evaluation, Term-at-a-time Evaluation, Optimization Techniques, Structured Queries, Distributed Evaluation, Caching,

Queries and Interfaces: Information Needs and Queries, Query Transformation and Refinement, Stopping and Stemming Revisited, Spell Checking and Suggestions, Query Expansion, Relevance Feedback, Context and Personalization, Showing the Results,

Result Pages and Snippets, Advertising and Search, Clustering the Results, Cross-Language Search

UNIT -IV

Retrieval Models: Overview of Retrieval Models, Boolean Retrieval, The Vector Space Model, Probabilistic Models, Information Retrieval as Classification. The BM25 Ranking Algorithm. Ranking Based on Language Models, Query Likelihood Ranking, Relevance Models and Pseudo-Relevance Feedback, Complex Queries and Combining Evidence, The Inference Network Model, The Galago Query Language, Web Search, Machine Learning and Information Retrieval, Learning to Rank, Topic Models and Vocabulary Mismatch, Application-Based Models,

Evaluating Search Engines: Why Evaluate, The Evaluation Corpus, Logging, Effectiveness Metrics, Recall and Precision, Averaging and Interpolation, Focusing on the Top Documents, Using Preferences, Efficiency Metric, Training, Testing, and Statistics, Significance Tests,
Setting Parameter Values, Online Testing, The Bottom Line,
Classification and Clustering: Classification and Categorization, Naïve Bayes, Support Vector Machines, Evaluation, Classifier and Feature Selection, Spam, Sentiment, and Online Advertising, Clustering, Hierarchical and K-Means Clustering, K Nearest Neighbor Clustering, Evaluation, How to Choose K, Clustering and Search

UNIT-V
Social Search: What Is Social Search, User Tags and Manual Indexing, Searching Tags, Inferring Missing Tags, Browsing and Tag Clouds, Searching with Communities, What Is a Community, Finding Communities, Community-Based Question Answering, Collaborative Searching, Filtering and Recommending, Document Filtering, Collaborative Filtering, Peer-to-Peer and Metasearch, Distributed Search,P2P Networks
Beyond Bag of Words: Overview, Feature-Based Retrieval Models, Term Dependence Models, Structure Revisited, XML Retrieval, Entity Search, Longer Questions, Better Answers, Words, Pictures, and Music

Course Outcomes:
After the completion of this course the student should be able to

1. Understand the importance of Search Engines for Information Retrieval.
2. Acquire knowledge on Basic Building Blocks of any search engine and how they really work for retrieving the required information.
3. Analyze the importance of Crawls and Feeds and their nature of work and also the importance of removing noise to improve the search process.
4. Demonstrate the different Ranking and Indexing techniques followed by the search engines and also identify the different interfaces supported.
5. Compare the different information retrieval models and their functionality in information search.
6. Relate the web search with the social search and meta search using Bag of Words.

Text Books:

1. Introduction to Information Retrieval by Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze
2. Search Engines Information Retrieval in Practice by W. Bruce Croft Donald Metzler Trevor Strohman

Reference Books:

1.(MG) Managing Gigabytes, by I. Witten, A. Moffat, and T. Bell.
2. (IRAH) Information Retrieval: Algorithms and Heuristics, by D. Grossman and O. Frieder.
3. (MIR) Modern Information Retrieval, by R. Baeza-Yates and B. Ribeiro-Neto.
4. (FSNLP) Foundations of Statistical Natural Language Processing, by C. Manning and H. Schütze.
5. (SE) Search Engines: Information Retrieval in Practice, by B. Croft, D. Metzler, and T. Strohman.
6. (IRIE) Information Retrieval: Implementing and Evaluating Search Engines, by S. Büttcher, C. Clarke, and G. Cormack.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M18CN21) DATABASE SECURITYAND ACESS CONTROL
(PROGRAM ELECTIVE- V)

M.Tech: III-Semester **L/T/P C**
3/-/- 3

Course Objectives: To learn the security of databases
- To learn the design techniques of database security
- To learn the secure software design
- Course Outcomes: Ability to carry out a risk analysis for large database.
- Ability to set up, and maintain the accounts with privileges and roles.

UNIT- I:
Introduction: Introduction to Databases Security Problems in Databases Security Controls Conclusions Security Models -1: 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

UNIT-II:
Security Models -2: 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 conclusion 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- III:
Security Software Design: Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design 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- IV:
Models for the Protection of New Generation Database Systems -1: 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

UNIT-V:
Models for the Protection of New Generation Database Systems -2: A Model for the Protection of New Generation Database Systems: the Orion Model ajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

Course Outcomes:
After the completion of this course the student should be able to
1. Gain complete knowledge on database security problems and make a study on level 1 security models.
2. Understand the concepts of User Identification/Authentication and trusted computer systems in level 2 security models.
3. Classify the different design issues related to
    a. Security Software and Secure Operating System
    b. Secure DBMS and Security Packages

c. Statistical Database Protection & Intrusion Detection Systems

4. Understand the level 1 models for protection of new generation database systems specially for the protection of Object Oriented System.
5. Analyze the Orion Model , ajodia and Kogan's Model under the level 2 models for database systems protection.

TEXT BOOK:

1. Database Security by Castano Pearson Edition (lie) Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, Hassan Afyouni, THOMSON Edition.

REFERENCE BOOK:

1. Database security by alfred basta, melissazgola, CENGAGE learning.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)
(M18MA01) ADVANCED OPTIMIZATION TECHNIQUES
(Open Elective)

M.Tech:III-Semester **L/T/P C**
3/0/- 3

UNIT-I:
Single Variable Non-Linear Unconstrained Optimization: One dimensional Optimization methods:- Uni-modal function, elimination methods, ,, Fibonacci method, golden section method, interpolation methods – quadratic & cubic interpolation methods.

UNIT-II:
Multi variable non-linear unconstrained optimization: Direct search method – Univariant method - pattern search methods – Powell's- Hook -Jeeves, Rosenbrock search methods- gradient methods, gradient of function, steepest decent method, Fletcher Reeves method, variable metric method.

UNIT-III:
Linear Programming: Formulation – Sensitivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints. Simulation – Introduction – Types- steps – application – inventory – queuing systems

UNIT –IV"
Integer Programming: Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method Stochastic programming: Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, co variance, joint probability distribution-stochastic linear, dynamic programming.

UNIT-V:
Geometric Programming: Polynomials – arithmetic - geometric inequality – unconstrained G.Pconstrained G.P (<= TYPE ONLY) Non-traditional optimization Techniques: Genetic Algorithms-Steps-Solving simple problemsComparitions of similarities and dissimilarities between traditional and non-traditional techniquesParticle Swarm Optimization (PSO)- Steps(Just understanding)-Simulated Annealing-Steps-Simple problems.

Course Outcomes:
After the completion of this course the student should be able to:

1. Describe problem clearly, identify and analyze the individual functions.
2. Analyze study on solving optimization problem.
3. Translate verbal formula on optimization problem.
4. Design algorithms, reliably to find an approximate solution.
5. Evaluate and compare the performance of an algorithm.
6. Discovery, study, understand and solve optimization techniques using algorithms.

REFERENCES:
1. Optimization theory & Applications / S.S. Rao / New Age International.
2. Engineering Optimization-Kalyan Deb/ PHI
3. Introductory to operation Research / Kasan & Kumar / Springar
4. Optimization Techniques theory and practice / M.C.Joshi, K.M. Moudgalya/ Narosa
5. Publications
6. Operation Research / H.A. Taha /TMH

7. Optimization in operations research / R.L Rardin 8. Optimization Techniques /Benugundu & Chandraputla / Pearson Asia

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M18SE27) WASTE MANAGEMENT
(Open Elective)

M.Tech: III-Semester **L/T/P C**
3/0/- 3

Week This course covers various aspects of hazardous waste, biomedical waste and E-waste such as collection, segregation, recovery, labeling requirements, storage areas, treatment and disposal facilities.

UNIT-I:
Sources, Composition and characteristic of hazardous waste, Hazardous Waste (Management and Handling) Rules, 1989 and amendments, Federal Hazardous Waste Regulations under RCRA, Superfund, CERCLA and SARA. Toxicology, public health impact, Protocols, issues and challenges in transportation of hazardous waste.

UNIT-II:
Municipal Solid Waste Management – Fundamentals Sources; composition; generation rates; collection of waste; separation, transfer and transport of waste; treatment and disposal options Radioactive Waste Management – Fundamentals Sources, measures and health effects; nuclear power plants and fuel production; waste generation from nuclear power plants; disposal options

UNIT-III:
Characterization of medical waste- Bio-medical wastes (Management and Handling) Rules, 1998, Amendments and guidelines, segregation, packaging, storage, transport of infectious waste. Techniques of Biomedical waste management. Health and safety rules. Protocols, issues and challenges in transportation of Biomedical waste.

UNIT-IV:
Treatment method- Autoclave, Hydroclave, Microwave, Chemical Disinfection, Solidification and stabilization, Bioremediation, Thermal Conversion Technologies, accumulation and storage of hazardous waste, land disposal of hazardous waste, other treatment and disposal method. Common Hazardous Waste Treatment facilities (TSDF).

UNIT- V:
E-waste: Introduction, toxicity due to hazardous substances in e-waste and their impacts, domestic e-waste disposal, e-waste management, technologies for recovery of resource from electronic waste, guidelines for environmentally sound management of e-waste, occupational and environmental health perspectives of recycling e-waste in India.

Course Outcomes:
After the completion of this course the student should be able to:

1. Evaluate the subject from the technical, legal and economical points .
2. Learn solid waste management.
3. Describe environment for sound management.
4. Understand a municipal solid waste management system.
5. Plan a solid waste management system for decision makers.
6. Design an incineration facility.

Reference Books:

- Tchobanoglous G., Theisen H., Viquel S.A., "Integrated Solid Waste Management: Engineering,
- Principles and Management issues", Tata McGraw Hill Publishing Company Ltd., New Delhi.

- CPHEEO Manual on Municipal Solid Waste Management.
- Peavy H.S., Rowe D.R., Tchobanoglous G., "Environmental Engineering", Tata McGraw Hill Publishing Company Ltd., New Delhi.
- Cunningham W.P., Cunningham M.A., "Principles of Environmental Science", Tata McGraw Hill Publishing Company Ltd., New Delhi.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M18VL07) EMBEDDED SYSTEM DESIGN
(Open Elective)

M.Tech: III-Semester **L/T/P C**
3/-/- 3

Course Objectives:
To explain various embedded system applications and design requirements.
- To construct embedded system hardware.
- To develop software programs to control embedded system.
- To generate product specification for embedded system.

UNIT-I:
Introduction to Embedded Systems: Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software, Complex System Design, Design Process in Embedded System, Formalization of System Design, Classification of Embedded Systems

UNIT-II:
8051 and Advanced Processor Architecture: 8051 Architecture, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts, Introduction to Advanced Architectures, Real World Interfacing, Processor and Memory organization - Devices and Communication Buses for Devices Network: Serial and parallel Devices & ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Internet Enabled Systems, Wireless and Mobile System protocols

UNIT-III:
Embedded Programming Concepts: Software programming in Assembly language and High Level Language, Data types, Structures, Modifiers, Loops and Pointers, Macros and Functions, object oriented Programming, Embedded Programming in C++ & JAVA

UNIT-IV:
Real – Time Operating Systems: OS Services, Process and Memory Management, Real – Time Operating Systems, Basic Design Using an RTOS, Task Scheduling Models, Interrupt Latency, Response of Task as Performance Metrics - RTOS Programming: Basic functions and Types of RTOSES, RTOS VxWorks, Windows CE

UNIT-V:
Embedded Software Development Process and Tools: Introduction to Embedded Software Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware-Software Design and Co-Design - Testing, Simulation and Debugging Techniques and Tools: Testing on Host Machine, Simulators, Laboratory Tools.

Course Outcomes:
After the completion of this course the student should be able to
1. Explain the different embedded system design techniques and the metrics or challenges in designing them.
2. Understand the complete architecture of 8051 and Advanced Processor.
3. Demonstrate Software programming in Assembly language and High Level Language.

4. Develop code for object oriented Programming, Embedded Programming using Macros and Functions in c++ and java.
5. Classify the different Real Time Operating System (RTOS), RTOS Vx Works, Windows CE.
6. Understand the Embedded Software Development Process and Tools.

TEXT BOOK:

1. Embedded Systems, Raj Kamal, Second Edition TMH.
2. Introduction to Embedded Systems by K.V.Shibu.

REFERENCE BOOKS:

1. Embedded/Real-Time Systems, Dr. K.V.K.K. Prasad, dream Tech press
2. The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Pearson.
3. The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson.
4. An Embedded Software Primer, David E. Simon, Pearson Education.
5. Micro Controllers, Ajay V Deshmukhi, TMH.
6. Microcontrollers, Raj Kamal, Pearson Education.
7. Introduction to Embedded Systems, Shibu K. V, TMH.

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