JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech in Computer Networks and Information Security (CNIS)
Common to (Computer Networks, CNIS)

EFFECTIVE FROM ACADEMIC YEAR 2017- 18 ADMITTED BATCH

COURSE STRUCTURE AND SYLLABUS

I Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-1	Advanced Algorithms	25	75	4	0	0	4
PC-2	Computer Networking	25	75	4	0	0	4
PC-3	Cryptography and Network Security	25	75	4	0	0	4
PE-1	1. Privacy and Security in Cyber Space 2. Software Defined Networks 3. Network Management and Performance Evaluation 4. Cloud Computing	25	75	3	0	0	3
PE-2	1. Internet of Things 2. Embedded Systems 3. Distributed Systems and security 4. Database Security	25	75	3	0	0	3
OE-1	***Open Elective – 1**	25	75	3	0	0	3
Laboratory I	Algorithms and Information Security Lab	25	75	0	0	3	2
Seminar I	Seminar-I	100	0	0	0	3	2
Total		**275**	**525**	**21**	**0**	**6**	**25**

II Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-4	Network Programming	25	75	4	0	0	4
PC-5	Wireless Networks	25	75	4	0	0	4
PC-6	IT Security-Threats and Vulnerability	25	75	4	0	0	4
PE-3	1. Internet Technologies and Services 2. Digital Watermarking and Steganography 3. **Big Data Analytics** 4. Network Security Standards and Applications Evaluation	25	75	**3**	0	0	3
PE4	1. Storage Area Networks 2. Ethical Hacking 3. Cyber Security 4. Information Systems control and Audit	25	75	**3**	0	0	3
OE-2	***Open Elective – 2**	25	75	3	0	0	3
Laboratory II	Network Programming Lab	25	75	0	0	3	2
Seminar II	Seminar -II	100	0	0	0	3	2
Total		**275**	**525**	**21**	**0**	**6**	**25**

III Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Technical Paper Writing	100	0	0	3	0	2
Comprehensive Viva-Voce	0	100	0	0	0	4
Project work Review II	100	0	0	0	22	8
Total	**200**	**100**	0	**3**	22	**14**

IV Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Project work Review III	100	0	0	0	24	8
Project Evaluation (Viva-Voce)	0	100	0	0	0	16
Total	**100**	**100**	**0**	**0**	**24**	**24**

***Open Elective subjects must be chosen from the list of open electives offered by OTHER departments.**

 # For Project review I, please refer 7.10 in R17 Academic Regulations.

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M.Tech – CN/CNIS - I Year - II Sem

NETWORK PROGRAMMING (PC – 4)

Course Objectives:

- To understand to 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 locking-lockf 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, Client-Server 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.

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, rp 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)

REFERENCE BOOKS:

1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. UNIX for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.
4. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
5. Unix Network Programming The Sockets Networking API, Vol.-I,W.R.Stevens, Bill Fenner, A.M.Rudoff, Pearson Education.
6. Unix Internals, U.Vahalia, Pearson Education.
7. Unix shell Programming, S.G.Kochan and P.Wood, 3rd edition, Pearson Education.
8. C Programming Language, Kernighan and Ritchie, PHI

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WIRELESS NETWORKS (PC – 5)

Course Objectives:

- To identify the principal components of telecommunications networks and key networking technologies.
- To implement how the Internet and Internet technology works.
- To identify the principal technologies and standards for wireless networking, communication, and Internet access.
- To describe troubleshooting techniques for wireless networks.

UNIT - I

Overview of Wireless Networks: Introduction, Different generations of wireless networks. Characteristics of The Wireless Medium: Introduction, radio propagation mechanisms, path-loss modeling and signal coverage, effects of multi path and Doppler, channel measurement and modeling techniques.

UNIT - II

Physical Layer Alternatives for Wireless Networks: Introduction, applied wireless transmission techniques, short distance base band transmission, UWB pulse transmission, Carrier Modulated transmission, Broadband modems for higher speeds, Spread Spectrum transmissions, High-speed Modems for Spread spectrum technology, Diversity and Smart Receiving Techniques, Comparison of modulation schemes, Coding techniques for wireless communications.

UNIT - III

Wireless Medium Access Alternatives: Introduction, fixed-assignment access for Voice-Oriented networks, Random access for Data-Oriented Networks, Integration of Voice and Data Traffic. Network Planning: Introduction, wireless network topologies, Cellular Topology, Cell Fundamentals, Signal-to-interference ratio calculation, capacity Expansion Techniques, network planning for CDMA systems.

UNIT - IV

Wireless Network Operation: Introduction, mobility management, radio resources and power management, security in wireless networks. Wireless Application Protocol: Design and Principles of Operation, WAP Architecture & Components, WAE Overview, WAE Model, WTA Architecture, WTA Framework Components, WSP Specification, WTP Specification, WTLS Specification, WDP Specification

UNIT - V

Bluetooth Design and Principles of Operation, Transmitter Characteristics, Bluetooth Security, Link Manager Protocol, Logical Link Control and Adaptation Layer Protocol, Alternatives to Bluetooth. WIRELESS LANs: Benefits of WLANs, Design and principles of Operation, WLAN Configurations, Microcells and Roaming, Types of WLANS, IEEE802.11, IEEE802.11a, IEEE802.11b

TEXT BOOKS:

1. Kaveh Pahlavan and Prashant Krishnamurthy," Principles of Wireless Networks-a Unified approach", Pearson, 2004.
2. Gary S.Rogers et al, "An Introduction to Wireless Technology", Pearson, 2007.

REFERENCE BOOKS:

1. William Stallings, "Wireless communications and Networks", Pearson education, 2005, ISBN 81-7808-560-7

2 Jim Geier, “Wireless Networks first-step”, Pearson, 2005.
3 Sumit Kasera et al, “2.5G Mobile Networks: GPRS and EDGE”, TMH, 2008.
4 Matthew S.Gast, “802.11 Wireless Networks”, O’Reilly, Second Edition, 2006.
5. Theodore s. Rappaport, “Wireless Communications –principles and practice”, second edition, PHI, 2002
6. C.S.R.Prabhu et al, “Bluetooth Technology and its Applications with Java and J2ME”, PHI, 2007.

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IT SECURITY – THREATS AND VULNERABILITY (PC – 6)

UNIT-1
Information Security
Introduction, How Much of Our Daily Lives Relies on Computers, Security Truisms, Basic Security, Terminology, Cyber Ethics, The Perception of Security, Threat Model, Security Is a Multidisciplinary Topic, Security Role-Playing Characters

UNIT – II
Passwords under Attack
Introduction, Authentication Process, Password Threats, Strong Passwords, Password Management.
Email Security – Introduction, Email Systems, Email Security and Privacy

UNIT- III
Malware The Dark Side of Software, What Is Malware?, How Do I Get Malware?, What Does Malware Do?, **Malware: Defense in Depth,** Introduction, Data Backup, Firewalls, Software Patches, Antivirus Software, User Education
Securely Surfing the World Wide Web
Introduction, Web Browser, "HTTP Secure", Web Browser History, **Online Shopping**, Consumer Decisions, Spyware and Key-Loggers, Wireless Sniffing, Scams and Phishing Websites, Misuse and Exposure of Information

UNIT- IV
Wireless Internet Security
Introduction, How Wireless Networks Work, Wireless Security Threats, Public Wi-Fi Security, Wireless Network Administration
Social Networking
Introduction, Choose Your Friends Wisely, Information Sharing, Malware and Phishing

UNIT- V
Social Engineering: Phishing for Suckers
Introduction, Social Engineering: Malware Distribution, Phishing, Detecting a Phishing URL, Application of Knowledge
Staying Safe Online: The Human Threat
Introduction, The Differences between Cyberspace and the Physical World, Consider the Context: Watch What You Say and How It Is Communicated, What You Do on the Internet Lasts Forever, Nothing Is Private, Now or in the Future, Can You Really Tell Who You Are Talking with?, Cameras and Photo Sharing, I Am a Good Person, That Would Never Happen to Me, Is There Anything I Can Do to Make the Internet a Safer Place for My Child?

TEXTBOOKS
1. Douglas Jacobson, Joseph Idziorek, “Computer Security Literacy: Staying Safe in a Digital World”, CRC Press

REFERENCES
1. Elementary Information Security, 2/e by Richard E Smith
2. Hacker Techniques, Tools, and Incident Handling, 2/e by Sean Philip Oriyano
3. Fundamentals of Information Systems Security, 3/e by David Kim & Michael G. Solomon
4. Internet Security: How to Defend Against Attackers on the Web, 2/e by Mike Harwood

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INTERNET TECHNOLOGIES AND SERVICES (PE - III)

Course Objective:
The student who has knowledge of programming with java should be able to develop web based solutions using multi-tier architecture. S/he should have good understanding of different technologies on client and server side components as Follows:
Client Side: HTML5, CSS3, Javascript, Ajax, JQuery and JSON
Server Side: Servlets, JSP
Database: MySQL with Hibernate and Connection Pooling
Framework: Struts with validation framework, Internationalization (I18N)
SOA: Service Oriented Architecture, Web services fundamentals, Axis framework for WS

UNIT- I
Client Side Technologies: Overview of HTML - Common tags, XHTML, capabilities of HTML5 Cascading Style sheets, CSS3 enhancements, linking to HTML Pages, Classes in CSS
Introduction to JavaScripts, variables, arrays, methods and string manipulation, BOM/DOM (Browser/Document Object Model), accessing elements by ID, Objects in JavaScript
Dynamic HTML with JavaScript and with CSS, form validation with JavaScript, Handling Timer Events
Simplifying scripting with JQuery, JASON for Information exchange.

UNIT - II
Introduction to Java Servlets: Introduction to Servlets: Lifecycle of a Servlet, Reading request and initialization parameters, Writing output to response, MIME types in response, Session Tracking: Using Cookies and Sessions
Steps involved in Deploying an application
Database Access with JDBC and Connection Pooling
Introduction to XML, XML Parsing with DOM and SAX Parsers in Java
Ajax - Ajax programming with JSP/Servlets, creating XML Http Object for various browsers, Sending request, Processing response data and displaying it.
Introduction to Hibernate

UNIT - III
Introduction to JSP: JSP Application Development: Types of JSP Constructs (Directives, Declarations, Expressions, Code Snippets), Generating Dynamic Content, Exception Handling, Implicit JSP Objects, Conditional Processing, Sharing Data Between JSP pages, Sharing Session and Application Data, Using user defined classes with jsp:useBean tag, Accessing a Database from a JSP

UNIT - IV
Introduction to Struts Framework: Introduction to MVC architecture, Anatomy of a simple struts2 application, struts configuration file, Presentation layer with JSP, JSP bean, html and logic tag libraries, Struts Controller class, Using form data in Actions, Page Forwarding, validation frame work, Internationalization

UNIT - V
Service Oriented Architecture and Web Services Overview of Service Oriented Architecture – SOA concepts, Key Service Characteristics, Technical Benefits of a SOA
Introduction to Web Services– The definition of web services, basic operational model of web services, basic steps of implementing web services.

Core fundamentals of SOAP – SOAP Message Structure, SOAP encoding, SOAP message exchange models,
Describing Web Services –Web Services life cycle, anatomy of WSDL
Introduction to Axis– Installing axis web service framework, deploying a java web service on axis.
Web Services Interoperability **–** Creating java and .Net client applications for an Axis Web Service
(Note: The Reference Platform for the course will be open source products Apache Tomcat Application Server, MySQL database, Hibernate and Axis)

TEXT BOOKS:

1. Web Programming, building internet applications, Chris Bates 3rd edition, WILEY Dreamtech .
2. The complete Reference Java 7th Edition , Herbert Schildt., TMH.
3. Java Server Pages,Hans Bergsten, SPD, O'Reilly.
4. Professional Jakarta Struts - James Goodwill, Richard Hightower, Wrox Publishers.
5. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India, rp – 2008.
6. Understanding SOA with Web Services, Eric Newcomer and Greg Lomow, Pearson Edition – 2009
7. Java Web Service Architecture, James McGovern, Sameer Tyagi et al., Elsevier - 2009

REFERENCE BOOKS:

1. Programming the world wide web,4th edition,R.W.Sebesta,Pearson
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE
3. TECHNOLOGIES , Marty Hall and Larry Brown Pearson
4. Internet and World Wide Web – How to program , Dietel and Nieto PHI/Pearson.
5. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly.
6. Professional Java Server Programming,S.Allamaraju & othersApress(dreamtech).
7. Java Server Programming ,Ivan Bayross and others,The X Team,SPD
8. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Cengage Learning.
9. Beginning Web Programming-Jon Duckett,WROX.

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DIGITAL WATERMARKING AND STEGANOGRAPHY (PE - III)

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

REFERENCES:

1. Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, “Digital Watermarking and Steganography”, Margan Kaufmann Publishers, New York, 2008.
2. Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, “Digital Watermarking”, Margan Kaufmann Publishers, New York, 2003.
3. Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, “Techniques and Applications of Digital Watermarking and Contest Protection”, Artech House, London, 2003.
4. Juergen Seits, “Digital Watermarking for Digital Media”, IDEA Group Publisher, New York, 2005.
5. Peter Wayner, “Disappearing Cryptography – Information Hiding: Steganography & Watermarking”, Morgan Kaufmann Publishers, New York, 2002.

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BIG DATA ANALYTICS (PE - III)

Course Objectives:

- To understand about big data
- To learn the analytics of Big Data
- To Understand the MapReduce fundamentals

UNIT - I

Big Data Analytics : What is big data, History of Data Management ; Structuring Big Data ; Elements of Big Data ; Big Data Analytics; Distributed and Parallel Computing for Big Data;
Big Data Analytics: What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; Basically Available Soft State Eventual Consistency (BASE); Open source Analytics Tools

UNIT- II

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics;
Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

UNIT - III

Understanding MapReduce Fundamentals and HBase : The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop : Introduction of HDFS, Architecture, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS;

UNIT - IV

Big Data Technology Landscape and Hadoop : NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors; HDFC (Hadoop Distributed File System), HDFC Daemons, read,write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN.

UNIT - V

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets;
Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools;

TEXT BOOKS

1. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. BIG DATA, Black Book™ , DreamTech Press, 2015 Edition.
3. BUSINESS ANALYTICS 5e , BY Albright |Winston

REFERENCE BOOKS:

1. Rajiv Sabherwal, Irma Becerra- Fernandez," Business Intelligence –Practice, Technologies and Management", John Wiley 2011.
2. Lariss T. Moss, Shaku Atre, " Business Intelligence Roadmap", Addison-Wesley It Service.
3 Yuli Vasiliev, " Oracle Business Intelligence : The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012

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NETWORK SECURITY STANDARDS AND APPLICATIONS EVALUATION (PE - III)

Course Objectives:

- Compile, analyze, and assess the applicability of best practices in addressing information security issues relevant to the cyber security community
- Evaluate the impact of business constraints and processes on the implementation of network security programs
- Integrate principles and techniques of risk analysis, project planning and change management in the development of network security strategies
- Demonstrate secondary research skills in the investigation and selection of best practice solutions to address network security challenges
- Demonstrate mastery of theory, concepts and skills in addressing specialized aspects of network security Applications

UNIT I

Introduction to Information Security: Introduction, Critical Characteristics, threats to information Security, Attacks on Information Security, Security Professionals and the Organization, Information Security Policies, Standards and Practices, Frameworks for Industry Standards in Information Security.

UNIT II

Auditing, Monitoring, and Logging: Monitoring Network Systems, Configuration and Change Management,

Introduction to security audits, need for security audits, organizational roles, Auditor's roles, Types of security audits, Audit approaches, Technology based audits ,Auditing (Formal Reviews), Systems Certification, Accreditation and Authorization,

UNIT III

Contingency Planning and Networking Incident Response: Introduction, What is Contingency Planning?, Incedent Response Plan,

Network Authentication and Remote Access Using VPN: Introduction, Access Control, Virtual Private Networks.

UNIT IV

Network Monitoring and Intrusion Detection and Prevention Systems: Introduction, Network monitoring Software : Packet Sniffing, Intrusion Detection and Prevention Systems, Honeypots and Honeynets.

UNIT V

Wireless Network Security: Introduction, Wireless Technologies and Standards, Wireless Architectures and Topologies, Wireless Security Protocols, WLAN Security Concerns, Bluetooth

TEXT BOOKS:

1. Guide to Network Security by Michael Whitman, Herb Mattord,David Mackey, Andrew Green Cengage Learinng
2. Information Systems Security, *Nina Godbole*, Wiley India, 2009
3. Principles and Practices of Information Security. *Michael E. Whitman, Herbert J. Mattord*, Cengage Learning,

REFERENCES:

1. Microsoft Security Risk Management Guide
2. Risk Management Guide for Information Technology Systems http://csrc.nist.gov/publications/nistpubs/800-30/sp800-30.pdf
3. OCTAVE approach http://www.cert.org/octave/
4. COBIT http://www.isaca.org/
5. Guide to Firewalls and Policies (Unit 3) http://csrc.nist.gov/publications/nistpubs/800-41/sp800-41.pdf
6. Firewalls and Network Security, Micheal E.Whitman, et al. Cengage Learning, 2008
7. Audit Trails (Unit 7) http://csrc.nist.gov/publications/nistpubs/800-12/800-12-html/chapter18.html
8. Information Security Management Handook, Harold F. Tipton, CRC Press, 2012
9. Information Security Policies and Procedures, 2nd Edition, Thomas R. Peltier, Auerbach, 2004

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STORAGE AREA NETWORKS (PE - IV)

Course Objectives:

- To understand Storage Area Networks characteristics and components.
- To become familiar with the SAN vendors and their products
- To learn Fibre Channel protocols and how SAN components use them to communicate with each other
- To become familiar with Cisco MDS 9000 Multilayer Directors and Fabric Switches Thoroughly learn Cisco SAN-OS features.
- To understand the use of all SAN-OS commands. Practice variations of SANOS features

UNIT- I

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

UNIT- II

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

UNIT- III

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

UNIT - IV

Information Availability & Monitoring & Managing Datacenter List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) ,RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures, Architecture of backup/recovery and the different backup/recovery topologies , replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities

Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center

UNIT - V

Securing Storage and Storage Virtualization Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each

domain, Virtualization technologies, block-level and file-level virtualization technologies and processes

Case Studies

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

TEXT BOOK:

1. EMC Corporation, Information Storage and Management, Wiley.

REFERENCE BOOKS:

1. Robert Spalding, “Storage Networks: The Complete Reference“, Tata McGraw Hill, Osborne, 2003.
2. Marc Farley, “Building Storage Networks”, Tata McGraw Hill, Osborne, 2001.
3. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002.

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ETHICAL HACKING (PE - IV)

Prerequisites:

- A course on "Operating Systems"
- A course on "Computer Networks"
- A course on "Network Security and Cryptography"

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)

Course Outcomes:

- Gain the knowledge of the use and availability of tools to support an ethical hack
- Gain the knowledge of interpreting the results of a controlled attack
- Understand the role of politics, inherent and imposed limitations and metrics for planning of a test
- Comprehend the dangers associated with penetration testing

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

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech – CN/CNIS - I Year - II Sem

CYBER SECURITY (PE - IV)

Course Objectives:

- To learn about cyber crimes and how they are planned
- To learn the vulnerabilities of mobile and wireless devices
- To learn about the crimes in mobile and wireless devices

UNIT- I

Introduction to Cybercrime: Introduction, Cybercrime and Information security, who are cybercriminals, Classifications of Cybercrimes, Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

Cyber offenses: How criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT- II

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT - III

Cybercrimes and Cyber security: the Legal Perspectives

Introduction. Cyber Crime and Legal Landscape around the world, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario In India, Digital signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment
Cyber law, Technology and Students: Indian Scenario.

UNIT - IV

Understanding Computer Forensics: Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Chain of Custody concept, Network Forensics, Approaching a computer, Forensics Investigation, Challenges in Computer Forensics, Special Tools and Techniques
Forensics Auditing

UNIT - V

Cyber Security: Organizational Implications: Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOK:

1. **Cyber Security**: *Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Nina Godbole and Sunil Belapure, Wiley INDIA.
2. **Introduction to Cyber Security** , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

REFERENCE BOOK:

1. **Cyber Security Essentials**, James Graham, Richard Howard and Ryan Otson, CRC Press.

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INFORMATION SYSTEMS CONTROL AND AUDIT (PE - IV)

Course Objectives:

- To learn about the information system control
- To learn about the information system auditing
- To learn about the management control, application control framework.
- To learn about collection of evidence, evaluation of evidence

UNIT- I

Overview of Information System Auditing, Effect of Computers on Internal Controls, Effects of Computers on Auditing, Foundations of information Systems Auditing, Conducting an Information Systems Audit.

The management Control Framework-I: Introduction, Evaluating the planning Function, Evaluating the Leading Function, Evaluating the Controlling Function, Systems Development Management Controls, Approaches to Auditing Systems Development, Normative Models of the Systems Development Process, Evaluating the Major phases in the Systems Development Process, Programming Management Controls, Data Resource Management Controls.

UNIT- II

The Management Control Framework-II: Security Management Controls, Operations management Controls Quality assurance Management Controls.

The Application Control Framework-I: Boundary Controls, Input Controls, Communication Controls.

UNIT-III

The Application Control Framework-II: Processing Controls, Database Controls, output Controls.

UNIT- IV

Evidence Collection: Audit Software, Code Review, Test Data, and Code Comparison, Concurrent Auditing techniques, Interviews, Questionnaires, and Control Flowcharts. Performance Management tools.

UNIT -V

Evidence Evaluation: Evaluating Asset Safeguarding and Data Integrity, Evaluating System Effectiveness, Evaluating System Efficiency.

REFERENCES:

1. Ron Weber, Information Systems Control and Audit, Pearson Education, 2002.
2. M.Revathy Sriram, Systems Audit, TMH, New Delhi, 2001.
3. Jalote : Software Project Mangement in Practice, Pearson Education
4. Royce : Software Project Management, Pearson Education.

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NETWORK PROGRAMMING LAB

Course 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:

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

21. Write an awk script to find the factorial of a user supplied number.
22. ls –l command produces long listing of files.
23. Write an awk script 1) to print the selected fields (Ex: size and name of the files) from the file listing. 2) to print the size of all files and number of files.
24. Write an awk script to count the number of lines in a file that do not contain vowels.
25. Write an awk script to find the number of characters, words and lines in a file.
26. Write a c program that makes a copy of a file using
    a. Standard I/O b. System calls.
27. Write a C program that counts the number of blanks in a text file
    a. Using standard I/O b. Using system calls
28. Implement in C the following UNIX commands using system calls
    a. cat b. ls c. mv
29. Write a program that takes one or more file/directory names as command line input and reports the following information on the file.
    a. File type.
    b. Number of links.
    c. Time of last access.
    d. Read, Write and Execute permissions.
30. Write a c program to emulate the UNIX ls –l command.
31. Write a c program that creates a directory, puts a file into it, and then removes it.
32. Write a c program that searches for a file in a directory and reports whether the file is present in the directory or not.
33. Write a c program to list for every file in a directory, its inode number and file name.
34. Write a c program that creates a file containing hole which is occupying some space but having nothing.
35. Write a c program that demonstrates redirection of standard output to a file.

Ex: ls > f1.

36. 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.
37. Write a c program to create a Zombie process.
38. Write a c program that illustrates how an orphan is created.
39. Write a c program that creates a child process to execute a command. The command to be executed is passed on the command line.
40. 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.
41. Write a c program that illustrates how to execute two commands concurrently with a command pipe. Ex- ls –l | sort
42. Write c programs that illustrate communication between two unrelated processes using named pipe.
43. Write a c program in which a parent writes a message to a pipe and the child reads the message.
44. Write a c program that illustrates suspending and resuming processes using signals.
45. Write a c program that displays the real time of a day every 60 seconds, 10 times.
46. 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.
47. Write a C program that illustrates file-locking using semaphores.
48. Write a C program that implements a producer-consumer system with two processes. (Using semaphores).
49. Write client and server programs (using C) for
    a. Interaction between server and client processes using Unix Domain Sockets.

b. Interaction between server and client processes using Internet Domain Sockets.

50. Write a C program (sender.c)
a. To create a message queue with read and write permissions.
b. To write 3 messages to it with different priority numbers.
51. Write a C program (receiver.c) that receives the messages (from the above message queue as specified in 63.a) and displays them.
52. Write C program that illustrates two processes communicating via shared memory.
53. Design TCP iterative Client and server application to reverse the given input sentence
54. Design TCP iterative Client and server application to reverse the given input sentence
55. Design TCP client and server application to transfer file
56. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"
57. Design a TCP concurrent server to echo given set of sentences using poll functions
58. Design UDP Client and server application to reverse the given input sentence
59. Design UDP Client server to transfer a file
60. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
61. Design a RPC application to add and subtract a given pair of integers

TEXT BOOKS:

1. Advance Unix Programming Richard Stevens, Second Edition Pearson Education
2. Advance UNIX Programming, N.B. Venkateswarlu, BS Publication.
3. UNIX and Shell programming, B.A.Forouzan and R.F.Gilberg, Thomson.
4. UNIX and Shell Programming, M.G. Venkatesh Murthy, Pearson Education.
5. UNIX Shells by Example, 4th Edition, Elllie Quigley, Pearson Education.