SYLLABUS

M.Tech. (NETWORK MANAGEMENT & INFORMATION SECURITY)

1st SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore
www.scs.dauniv.ac.in

Course Name MTech (NM & IS) 1st Semester
Subject Code: CS-5615
Subject Name: Information Security

Aim of the Subject

The main aim of this course is to provide students with a background, foundation, and insight into the many dimensions of information security.

Objectives

1. To provide an introduction to the fundamental principles of cryptography and its applications on the network security domain.
2. To study various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
3. To be familiar with cryptographic techniques for secure (confidential) communication of two parties over an insecure (public) channel; verification of the authenticity of the source of a message.
4. To illustrate how network security and management mechanisms employ cryptography to prevent, detect, and mitigate security threats against the network

Learning Outcomes

1. To have a fundamental understanding of the objectives of cryptography and network security.
2. To become familiar with the cryptographic techniques that provides information and network security.
3. To impart knowledge on Encryption techniques, Design Principles and Modes of operation.
4. To analyze a given system with respect to security of the system.
5. To understand the Key Management techniques and Number Theory.
6. To create an understanding of Authentication functions the manner in which Message Authentication Codes and Hash Functions works.
7. To examine the issues and structure of Authentication Service and Electronic Mail Security.
7. To provide familiarity in Intrusion detection and Firewall Design Principles.

Unit 1

Computer Security Concepts, Introduction to Information Security, Confidentiality, Integrity, and Availability, Assets and Threats etc.

Unit 2

Basic Cryptographic Concepts, Symmetric Encryption Algorithms, Purpose of Cryptography, Data Encryption Standard (DES), Triple DES, Advanced Encryption Standard (AES) etc.

Unit 3

Public-Key Encryption, Introduction to Public-Key Cryptography, Public-Key Encryption Algorithms, RSA Public-Key Algorithm, Diffie-Hellman Algorithm etc.

Unit 4

Access Control Mechanisms, Authentication, Access Control and Authorization, Security Protocols and Solutions, Internet Protocol Security, Secure Sockets Layer, Pretty Good Privacy.

Unit 5

Firewalls, Intrusion Detection, and Intrusion Prevention, Security Protocols and Solutions, Firewall, Host-Based IDS vs. Network-Based IDS, Network Attacks and Defense.

Text Book(s)

1. Stallings William, Cryptography and Network Security: Principles and Practice, 6th Edition, Pearson/Prentice- Hall.
2. Atul Kahate, "Cryptography and Network Security", Second Edition.

Reference Material(s)

1. Mathew Bishop; Computer Security; Art and Science; Addison-Wisley Oct. 2007
2. Mathew Bishop; Introduction to computer Security; Addison-Wisley Oct 2004
3. Kaufman, Perlman and Speciner; "Network security"; Pearson Education 1995.

Course Name MTech (NM & IS) 1st Semester
Subject Code: CS-6220
Subject Name: Internet Programming Using Java

Aim of the Subject

To make students learn fundamental concept of coding and perform them practically and to develop problem-solving skills

Objectives

1.To make students learn the basics of coding
2.To develop concept in a logical and creative way.

Learning Outcomes

Description of knowledge to be acquired:
A student completing course unit 1 should :
1. Have an understanding of basics of coding with syntax.
2. To perform concepts practically including topics of core java.

A student completing course unit 2 should :
1. Have understanding of concepts logically.
2. Develop programming solving skills.
3.Have improvement of mathematical logics.
4.understand of concepts practically of inheritance ,exceptional handling, multithreading ,applets and Jdbc.

A student completing course unit 3 should :
1.Have understanding of fundamentals of HTTP and servlets.
2.Have understanding methods and to perform them practically.

A student completing course unit 4 should :
1.Have understanding of basics of Jsp
2.Have understanding of Jsp lifecycle and connection of Jsp with different database like oracle, ms-sql server and performing operations.

A student completing course unit 5 should :
1.Have understanding of basics of EJB and its types.
2.Have knowledge of creating and working with session bean.

Unit 1

Review of java concepts: Features of Java, Object-oriented programming overview, Introduction of Java Technologies, How to write simple Java programs, Data Types, Variables, Memory concepts, control statements, looping, Method Call Stack and Activation Record, Argument Promotion and Casting, Scope of declaration and Method Overloading, String Handling: The String constructors, String operators, Character Exaction, String comparison, String Buffer. Arrays: Declaring and Creating

Arrays, Enhanced for Statement, Passing Arrays to Method, Multidimensional Arrays, Variable-Length Argument lists, Using Command-line Arguments

Unit 2

Inheritance: Extending classes & related things. Packages and Interfaces: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, creating own packages Exception Handling: Introduction, overview of doing it and keywords used, when to use it, Multithreading: What are threads, The java thread model, Thread priorities, Thread life cycle, Thread Synchronization, Applets: Applet basics, Applet Architecture, Applet life cycle methods, Database connectivity: JDBC, The design of JDBC, Typical uses of JDBC

Unit 3

Introduction to HTTP, web Server and application Servers, Installation of Application servers, Config files, Web.xml. Java Servlet, Servlet Development Process, Deployment Descriptors, Generic Servlet, Lifecycle of Servlet. Servlet Packages, Classes, Interfaces, and Methods, Handling Forms with Servlet, Various methods of Session Handling, various elements of deployment descriptors

Unit 4

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects. Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL. java.sql Package. Querying a database, adding records, deleting records, modifying records, types of Statement. Separating Business Logic and Presentation Logic, Building and using JavaBean. Session handling in JSP, Types of errors and exceptions handling.

Unit 5

MVC Architecture Introduction to Remote Method Invocation, Introduction to Enterprise Java Bean, Types of EJB, Creating and working with Session Bean

Text Book(s)

1. Java 2: The Complete Reference by Herbert Schildt, Tata McGraw- Hill, 8th Edition, 2011.
2. K. Mukhar, “Beginning Java EE 5: From Novice to Professional”, Wrox Press.

Reference Material(s)

1. The Java Programming Language, Ken Arnold , James Gosling , David Holmes, 3rd Edition, Person Education, 2000.
2. Head First Java, Kathy Sierra, Bert Bates, O’Reilly Publication, 2nd Edition, 2005
3. M. Hall, L. Brown, “Core Servlets and Java Server Pages”, 2nd edition, Pearson Education

4. G. Franciscus, “Struts Recipes”, Manning Press
5. C. Bauer, G. King, “Hibernate in Action”, Manning Press
6. B. Basham, K. Sierra, B. Bates, “Head First Servlet and JSP”, 2nd Edition, O'Reilly Media.

Course Name MTech (NM & IS) 1st Semester
Subject Code: CS-6622
Subject Name: Advanced Computer Network

Aim of the Subject

This course aims to provide advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks. Laboratory Work: consists of creating simulated networks and passing packets through them using differe

Objectives

1. To study the problematic of service integration in TCP/IP networks focusing on protocol design, implementation and performance issues.
2. To debate the current trends and leading research in the computer networking area.

Learning Outcomes

1. To identify and discuss the concepts underlying IPv6 protocol, and their main characteristics and functionality.
2. To understand the principles and functionality of mobile IP, explaining its concretization in IPv6; to understand the needs of optimization of the mobility mechanisms and description of some extensions that aim to reduce handover latency and requirements from terminals.
3.To recognize the need for service integration and discuss how it can be accomplished.

Unit 1

Review of Basic Network Architectures: OSI reference model, TCP/IP reference model, ATM reference model; Applications (WWW, Audio/Video Streaming, Video conference, Networked Games, Client/Server); Traffic Characterization (CBR, VBR); Switching Paradigms; Multiplexing; Error Control; Flow Control, SONET, Optical Networks.

Unit 2

Local Area Network Technologies: Wired LANS: Ethernet Protocol, IEEE MAC Sublayer protocols - 802.3, 802.4, 802.5 and their management, Fast Ethernet, Gigabit Ethernet, Wireless LANs, IEEE 802.11 Project, Bluetooth, Connecting LANs.

Unit 3

Internetworks: Host-to-Host Delivery, Addressing - classful and classless addressing, subnetting and supernetting. Internetworking: Interdomain Routing, Border Gateway Protocol version 4, IPv6, Multicast Routing Protocols, Multi-Protocol Label Switching, Virtual Private Networks, High speed transport protocols, Quality of Service Mechanisms, Improving QoS in Internet.

Unit 4

Distributed Systems: Naming, DNS, DDNS, Paradigms for Communication in Internet, Caching, Issues of Scaling in Internet and Distributed Systems, Caching Techniques for Web, Protocols to Support Streaming Media, Multimedia Transport Protocols, Content Delivery Networks, Overlay and P2P Networks.

Unit 5

Applications and Other Networking Technologies: RTP, RTSP, SIP, VoIP, Security Systems, SSH, PGP, TLS, IPSEC, DDoS Attack, Mitigation in Internet, Security in MPLS; Introduction to Cellular, Satellite and Ad hoc Networks.

Text Book(s)

1. Behrouz A. Forouzan, Data Communications and Networking, Fourth Ed., Tata McGraw Hill.
2. 2. Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, Fourth Ed., Morgan Kaufmann .

Reference Material(s)

1. Jean Walrand and Pravin Varaiya, High performance Communication Networking, 2nd Ed., Morgan Kaufmann, 1999.
2. Markus Hoffmann and Leland R. Beaumont, Content Networking: Architecture, Protocols, and Practice, Morgan Kaufmann, 2005.

Course Name MTech (NM & IS) 1st Semester
Subject Code: CS-6624
Subject Name: Network Management

Aim of the Subject

To familiarize the student with the design, analysis, operation and management of data communications networks.

Objectives

1. Provide understanding of the fundamental concepts of network management.
2. Build a theoretical foundation of Network Management Protocols among students.
3. Provide the student with a working knowledge of the types of communications network management systems, their strengths and weaknesses in solving various network management problems.
4. Equip the students with an in-depth knowledge of how to install, maintain, and manage a Local Area Network, which helps the students to understand the actual working of computer network.

Learning Outcomes

1. Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
2. In depth understanding of transport layer concepts and protocol design; including connection-oriented and connection-less models, techniques to provide reliable data delivery, and algorithms for congestion control and flow control.
3. In depth understanding of various network management standards and their perceptive.
4. Understand the SMTP protocol and its working in detail.
5. Understand the basic concepts of broadband network Telecommunication network and their management.
5. Knowledge of Network Management Tools and Network Management Applications: Configuration management, Fault management, performance management, security management and accounting management.

Unit 1

Introduction: Computer Network, Goals and Applications, Data Communications and Network Management Overview : Communications protocols and Standards. Case Histories of Networking and Management, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

Fundamentals of computer network technology: Network Topology, LANs, Network node components Hubs, Bridges, Routers, Gateways, Switches, WAN, ISDN Transmission Technology. Network Management Standards, Network Management Model, Organization Model, Information Model, Communication Model, ASN.1, Encoding Structure.

Unit 2

SNMPv1 Network Management: Managed network: Case Histories and Examples, The History of SNMP Management. The SNMP Model, The Organization Model, System Overview. The Information Model, The SNMP Communication Model, Functional Model.
SNMPv2 Management: Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information. The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1.

Unit 3

SNMP Management-RMON: Introduction, RMON SMI and MIB, RMON1.
Broadband Network Management-ATM Networks: Broadband Networks and Services, ATM Technology, ATM Network Management.

Unit 4

Broadband Network Management: Broadband Access Networks and Technologies, HFC Technology, HFC Management, DSL Technology, ADSL Technology, ADSL Management.
Telecommunication Management Network: Introduction, Operations Systems, TMN conceptual Model, TMN Architecture, TMN Management Service Architecture, An integrated view of TMN.

Unit 5

Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management. Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.
Network Management Applications: Configuration management, Fault management, performance management. Event Correlation Techniques, security Management, Accounting management, Report Management, Policy Based Management Service Level Management.

Text Book(s)

• Mani Subrahmanian, Network Management: Principles and Practice, Pearson Education, 2nd Edition 2010.

Reference Material(s)

• Morris, Network management, Pearson Education.
• Mark Burges, Principles of Network System Administration, Wiley Dreamtech Publication.
• Paul, Distributed Network Management, John Wiley Publication.
• Andrew S. Tanenbaum, Computer Networks, Addison-Wesley, 4th Edition.
• B.A. Forouzan, Data Communications and Networking, McGraw-Hill.
• W. Stallings, Data and Computer Communications, Prentice-Hall, 5th Ed., 1997.
• James F. Kurose and Keith W. Rose, Computer Networking, Pearson Education, Third Edition, 2005.

CS-5615: Information Security

List of Assignment

1. Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.

2. Study of System threat attacks - Denial of Services.

3. Study of Sniffing and Spoofing attacks.

4. Study of Techniques uses for Web Based Password Capturing.

5. Study of Different attacks causes by Virus and Trojans.

6. Study of Anti-Intrusion Technique – Honey pot.

7. Study of Symmetric Encryption Scheme – RC4.

8. Study of IP based Authentication.

Programming Assignment

LIST OF EXPERIMENTS:

1. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:
a) Caesar Cipher
b) Playfair Cipher
c) Hill Cipher
d) Rail fence – row & Column Transformation

2. Implement the following algorithms
a) DES
b) RSA Algorithm
c) Diffiee-Hellman
d) MD5

3. Implement the Signature Scheme - Digital Signature Standard

4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures.

5. Setup a honey pot and monitor the honeypot on network.

6. Installation of rootkits and study about the variety of options

7. Perform wireless audit on an access point or a router and decrypt WEP and WPA. (Net Stumbler)

8. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

School of Computer Science & IT ,DAVV, Indore

CS-6220: Internet Programming using Java

M.Tech.(CS) & (NM)

Assignment

Note :

Study the uploaded PDF and PPT that we had discussed earlier in class ,based on this study and prepare assignment in word file .

Q1. Write a java program that has a method for the calculation of fourth power of 2.

Q 2. Write a java program that will accept command line argument and print the same.

Q 3. Write a java program that has a method for initialization of variable to 10 and 20 &another method display the same.

Q 4. Write a java program that prints the different time zones available with the time zones class.

Q 5. Write a java program that prints details about current date, time, month, year, day of the month, day of the week.

Q 6. Write a java program that will display the message "weight of bundle -5 kgs" in a constructor &display the weight in kilograms & grams.

Q 7. How to determine upper bound for two dimensional array in java.

Q 8. Write a java program to read 10 numbers and store in array .list out duplicate numbers, number of times duplication occurs.

Assignment 1

MTech (NM & IS) 1st Semester

Unit-1

CS-6622 Advanced Computer Network

1. Compare TCP/IP with OSI reference model with the functionality of each layer.
2. Why trailing bits are added at the end of frame why not in the header?
3. Why error control and flow control mechanism applied at transport layer if they are already applied at data link layer?
4. What are the needs of packet switching? Explain working of packet switching and also methods of packet switching.
5. Compare datagram and packet switching in terms of efficiency, delay etc.
6. Explain the various structures of switch. What is cross point in crossbar switch?
7. There are no sequence number in frame relay. Why?
8. Why is frame relay a better solution for connecting LANs than T-1 lines?
9. Compare SVC and PVC.
10. Why is multiplexing is more efficient if all the data units are of same size?
11. What is the relationship between TPs, VP, and VCs.
12. How is an ATM virtual connection identified?
13. Explain the layers of ATM reference model.