



School of Computer Science & IT Devi Ahilya Vishwavidyalaya

SYLLABUS

M.Tech (Network Management & Information Security) 2 years

Program Educational Objectives (PEOs)

- PEO 1:** Acquire practical knowledge in Network Management & Information Security and pursue careers as a network administrator or information security expert.
- PEO 2:** Demonstrate ability to administer state-of-the-art computer networks.
- PEO 3:** Build foundation to perform research in related domains and pursue successful careers in academia.

Program Specific Outcomes (PSOs)

- PSO 1:** Acquire knowledge of networking technologies and apply that knowledge to manage real computer networks using cutting edge network management tools.
- PSO 2:** Develop knowledge of security fundamentals and leverage that knowledge to ensure information security of an organization.

I - SEMESTER

CS-6220: Internet Programming Using Java

Aim:

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

Course Outcomes:

- CO 1: Understanding of OOPs concepts clearly
 - CO 2: Understanding of client server architecture and thier working
 - CO 3: Understanding database creating and server technologies
 - CO 4: providing knowledge of advance java concepts like servlet, JSP, etc.
 - CO 5: Understanding of MVC Architecture
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Unit-I

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 CallStack 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-II

Inheritance: Extending classes & related things, Packages and Interfaces: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, creating own packages Exception Handling: Introduction, over view 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-III

Introduction to HTTP, webServer and application Servers, Installation of Application servers, Config files, Web.xml. JavaServlet, 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-IV

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 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-V

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

Text Books:

1. Java2: 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 Book(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

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CS-5615: Information Security

Aim:

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

Course Outcomes:

- CO 1: Understand fundamental security concepts such as confidentiality, integrity, and availability.
 - CO 2: Identify and analyze various security threats and attacks.
 - CO 3: Apply symmetric and asymmetric cryptographic techniques for securing information.
 - CO 4: Implement access control mechanisms, digital signatures, and security protocols.
 - CO 5: Critically evaluate and apply security principles to real-world scenarios.
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Unit-I

Computer Security Concepts: Introduction to Information Security, Confidentiality, Integrity; Attacks and Threats: Attacks Threatening Confidentiality, Attacks Threatening Integrity, Attacks Threatening Availability; Active versus Passive attacks; Security Services, Security Mechanisms etc.

Unit-II

Symmetric Cipher Model: Cryptography, Cryptanalysis and Brute-Force Attack; Substitution Techniques: Caesar Cipher, Monoalphabetic Ciphers, Playfair Cipher, Hill Cipher; Polyalphabetic Ciphers, One-Time Pad; Transposition ciphers: keyless transposition ciphers, keyed transposition ciphers, combining two approaches; Steganography etc.

Unit-III

Stream Ciphers and Block Ciphers, Synchronous and Non-synchronous Stream Ciphers, Attacks on Block Ciphers, Substitution and Transposition, P-Boxes and S-Boxes, Diffusion and Confusion, Feistel Cipher, DES Encryption and Decryption, Double and Triple DES, Strength and weakness of DES etc

Unit-IV

Diffie-Hellman key exchange, Man in middle attack, International Data Encryption Algorithm (IDEA), (Ron Rivest) RC-5, Blowfish, Advanced encryption standard (AES).

Unit-V

Asymmetric-Key cryptography algorithms: RSA Algorithm, Digital Signatures, Attacks on Digital Signatures, Public Key Infrastructure (PKI): Digital Certificates, Private -Key Management. Access Control and Authorization.

Text Books:

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

Reference Book(s):

1. Behrouz A. Forouzan "Introduction to Cryptography and Network Security", McGraw-Hill Higher Education, 2008
2. Atul Kahate; "Cryptography and Network Security"; Tata McGraw-Hill
3. Mathew Bishop; Computer Security; Art and Science; Addison-Wisley Oct. 2007
4. Kaufman, Perlman and Speciner; "Network security"; Pearson Education 1995.

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CS-6624: Network Management

Aim:

To understand the principles of network management, different standards and protocols used in managing complex networks, the Automation of network management operations and making use of available network management systems.

Course Outcomes:

- CO 1: Gain in-depth theoretical and practical knowledge of network management tools and the skill to use them in monitoring a network, in particular of SNMP (Simple Network Management Protocol).
 - CO 2: Analyze the challenges faced by Network managers
 - CO 3: Analyze and interpret the data provided by network management systems and take suitable actions.
 - CO 4: Apply the knowledge to manage organization's network management systems.
 - CO 5: -
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Unit-I

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-II

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-III

SNMP Management-RMON: Introduction, RMON SMI and MIB, RMON1.

Broadband Network Management-ATM Networks: Broadband Networks and Services, ATM Technology, ATM Network Management.

Unit-IV

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-V

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 Books:

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

Reference Book(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.

CS-5637: Digital Forensics and Cyber Security

Aim: To equip students with knowledge and practical skills in digital forensics and cyber security for effective investigation, evidence handling, and legal compliance.

Course Outcomes (COs)

CO1: Understand the principles, practices, and methodologies of digital forensics and cyber security.

CO2: Analyze different types of cybercrimes, forensic tools, and investigation processes.

CO3: Apply forensic techniques and cyber security measures to real-world scenarios.

CO4: Evaluate forensic evidence, legal frameworks, and emerging cyber threats.

CO5: Implement digital forensics and cybersecurity solutions while adhering to ethical and legal standards.

Unit-I:

No. of Hours: 8

Digital Forensics – Introduction, Objectives, and Methodology; Rules of Digital Forensics; Good Forensic Practices; Daubert's Standards; and Principles of Digital Evidence.

Overview of the types of Computer Forensics, including Network Forensics, Mobile Forensics, Social Media Forensics, and E-mail Forensics. Services offered by Digital Forensics. First Responder – Role, Toolkit, and Do's and Don'ts.

Unit-II:

No. of Hours: 8

Classification of Cybercrime: Introduction, cybercrime against individuals, cybercrime against property, and cybercrime against the nation.

Cybercrime: The Present and the Future: Introduction to cyber war, cryptocurrency, Bitcoin, Ethereum, comparison between Bitcoin and Ethereum, blockchain, ransomware, deep web, and dark web with associated challenges.

Unit-III:

No. of Hours: 8

Digital Evidence: Introduction to digital evidence and evidence collection procedures, sources of evidence, and digital evidence obtained from standalone computers or electronic communication devices.

Introduction to Cyber Crime Investigation – Procedure for search and seizure of digital evidence in cyber-crime incidents. Forensic Investigation Process includes: pre-search considerations, acquisition, duplication and preservation of evidence, examination and analysis of evidence, storage of evidence, documentation and reporting, and maintaining the chain of custody.

Unit-IV :

No. of Hours: 8

Cyber Forensics – The Present and Future: Forensic tools, cyber forensic suites, drive imaging and validation tools, forensic tools for integrity verification and hashing, data recovery, RAM analysis, registry analysis, encryption and decryption, network analysis, mobile device analysis, and email analysis. The section also covers the need for computer forensic investigators and the career prospects available for forensic professionals.

Unit-V:

No. of Hours: 8

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IT Act: Offenses and Penalties- Offenses under the Information Technology Act, 2000; penalties and adjudication; punishments for contraventions under the Act (including case laws, rules, and recent judicial pronouncements to be discussed); and limitations of cyber law.

Text Books:

1. Dejay, Murugan, Cyber Forensics Oxford university press India Edition, 2018.
2. Nina Godbole and SunitBelapore; "Cyber Security: Understanding CyberCrimes, Computer Forensics and Legal Perspectives", Wiley Publications,2011.

Reference Book(s):

1. Bill Nelson, Amelia Phillips and Christopher Steuart; "Guide to Computer Forensics and Investigations" – 3rd Edition, Cengage, 2010 BBS.
2. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.
3. John Sammons, "The Basics of Digital Forensics - The Primer for Getting Started in Digital Forensics" Syngress is an imprint of Elsevier
4. Nihad A. Hassan, "Digital Forensics Basics - A Practical Guide Using Windows OS" Apress

Online Resources:

1. https://onlinecourses.swayam2.ac.in/cec20_lb06/preview
2. <https://www.cyberforensics.in/>
3. https://www.indiacode.nic.in/bitstream/123456789/13116/1/it_act_2000_updated.pdf

CS6418: Advanced Database Management System

Aim:

The aim of the course is to make students able to handle large database system (corporate database) and to be able to manipulate it efficiently.

Course Outcomes (COs)

CO1: Build strong foundation of query languages through relational algebra, calculus & QBE

CO2: Design conceptual, logical & physical database model through ER model and normalization.

CO3: Develop SQL proficiency on simple & advanced features with advanced functions like Concurrency, transaction on processing, and recovery in multi user environment

CO4: Acquire necessary skills for No SQL based database application development

CO5: Exposure to graph, spatial, and temporal databases

Unit-I:

No. of Hours: 8

Introduction: Advantages of DBMS approach, Various views of data, data independence, schema & sub-schema, primary concept of data models, database languages, transaction management, database administrator & user, data dictionary, database architectures. ER model: Basic concept, design issues, mapping constraint, keys, ER diagram, weak & strong entity-sets, specialization & generalization, aggregation, inheritance, design of ER schema, Reduction of ER Schema to tables. Domains, relation, kind of relation, Relational databases, Various types of keys: candidate, primary, alternate & foreign keys

Unit-II:

No. of Hours: 8

Relational Algebra and SQL: The structure, relational algebra with extended operations, modification of database, Idea of relational calculus, basic structure of SQL, Set operation, Aggregate functions, Null values, Nested Sub queries, derived relations, views, Modification of database, join relation, Domain, relation & keys, DDL in SQL.

Unit-III :

No. of Hours: 8

Functional dependencies & Normalization: basic definitions, Trivial & non trivial dependencies, closure set of dependencies & of attributes, Irreducible set of dependencies, introduction to normalization, non-loss decomposition, FD diagram, First, second and third normal forms, dependency preservation, BCNF, multivalve dependencies and fourth normal form, join dependencies and fifth normal form. Database Integrity: general idea, integrity rules, Domain rules, Attributes rules, assertion, triggers, integrity & SQL.

Unit-IV:

No. of Hours: 8

Transaction, Concurrency & Recovery: basic concept, ACID properties, transaction state, Implementation of atomicity & durability, Concurrent execution, Basic idea of serializability, Basic idea of concurrency control, basic idea of deadlock, Failure Classification, storage structure-types, stable storage implementation, data access, recovery & Atomicity: log based recovery, deferred database modification, immediate, Query-processing and optimization

Unit-V

No. of Hours: 8

Overview of Graph & Spatial Databases & NOSQL

Text Books:

1. DBMS by Sudarshan & Korth

Reference Book(s):

1. Internet material & eBooks for advanced topics Online Resources:

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