SYLLABUS

M.Tech. (COMPUTER SCIENCE)

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 (CS) 1st Semester
Subject Code: CS -5010
Subject Name: Advanced Computer Architecture

Aim of the Subject

Appreciate the technical skills necessary to be a capable computer architect.

Objectives

1. Understand the role of abstraction in the design of large digital systems, and explain the major software and hardware abstractions in contemporary computer systems.
2. Analyze the performance of digital systems using measures such as latency and throughput.
3. Design simple hardware systems based on a variety of digital abstractions such as ROMs and logic arrays, logic trees, state machines, pipelining, and buses. synthesize digital systems from a library of representative components and test the designs under simulation.
4. Understand the operation of a moderately complex digital system -- a simple RISC-based computer -- down to the gate level, and be able to synthesize, implement, and debug its components.
5. Understand the design of Multiprocessor systems.
6. Understand the operations of cloud.

Learning Outcomes

1. Complete and debug the design of a simple CPU with a given RISC-based instruction set.
2. Measure the memory access performance of a processor, and tune cache design parameters to improve performance.
3. Analyze the operation of page-based virtual memory systems.

Unit 1

Instruction Set Architectures: The von Neumann Model, Key Idea: Stored-program Computer, Anatomy of a von Neumann Computer, Instructions, Instruction Set Architecture (ISA), ISA Design, Beta ISA: Storage, Storage Conventions, Beta ISA: Instructions, Beta ALU Instructions, Beta ALU Instructions with Constant, Beta Load and Store Instructions,Beta Branch Instructions, Beta JMP Instruction

Unit 2

Building the Beta:CPU Design Tradeoffs, Processor Performance, Approach: Incremental Featurism, Multi-ported Register File, ALU Instructions, Instruction Fetch/Decode, ALU Op Datapath I, ALU Op Datapath II, Beta ALU Instructions, Beta ALU Instructions with Constant, Beta Load and Store Instructions,Beta Branch Instructions, Beta JMP Instruction, LDR Instruction , Exceptions, Exception

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Processing, Exception Implementation, Beta: Our “Final Answer”, Control Logic The Memory Hierarchy: Memory Technologies, Static RAM (SRAM), Dynamic RAM (DRAM), Non-Volatile Storage: Flash, Non-Volatile Storage: Hard Disk, The Locality Principle, Caches, A Typical Memory Hierarchy, Basic Cache Algorithm, Direct-Mapped Caches, Fully-Associative Cache, N-way Set-Associative Cache , Replacement Policies, Write Policy, Write-back, Write-back with “Dirty” Bits, Summary: Cache Tradeoffs

Unit 3

Pipelining the Beta: Reminder: Single-Cycle Beta, Pipelined Implementation, Pipeline Hazards, Simplified Unpipelined Beta Datapath, 5-Stage Pipelined Datapath, Pipelined Control, Pipeline Diagrams, Data Hazards, Resolving Hazards, Stall Logic , Bypass Logic, Control Hazards, Resolving Control Hazards, Branch Prediction , Exceptions

Unit 4

Parallel Processing: Processor Performance, 5-Stage Pipelined Processors, Improving 5-Stage Pipeline Performance, Instruction-level Parallelism (ILP), Wider or Superscalar Pipelines, A Modern Out-of-Order Superscalar Processor, Multicore Processors, Multicore Caches, Fix: “Snoopy” Cache Coherence Protocol

Unit 5

Cloud Computing Architecture: Cloud Computing, Advantages and Disadvantages, History of Cloud, Cloud Computing Technologies, Cloud Computing vs Grid Computing, How Cloud Works, Cloud Computing Applications, Security Risks of Cloud Computing, Types of Cloud: Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud, Cloud Service Models, Virtualization

Text Book(s)

Computation Structures (MIT Electrical Engineering and Computer Science)
by Stephen A. Ward , Robert H. Halstead

Reference Material(s)

https://computationstructures.org/

Course Name MTech (CS) 1st Semester
Subject Code: CS-5413
Subject Name: Data Mining and Warehousing

Aim of the Subject

To clear the concepts, applications and research challenges of data mining and data warehousing.

Objectives

- 1.To present an overview of data warehousing process.
- 2. To make students understand tools and techniques of On Line Analytical Processing (OLAP)
- 3. Learn to create data warehouse data models, data warehouse design, storage and implementation techniques.
- 4. Identify and learn useful algorithms to discover useful knowledge out of tremendous data volumes. Also to determine in what application areas can data mining be applied.
- 5. To present an overview of Big Data Analytics techniques.

Learning Outcomes

A student completing course unit 1 should:

1) Have an understanding of the foundations, the design, the maintenance, the evolution, and the use of data warehouses
2) To understand data warehouse architecture.
3) To understand the step by step process of data warehouse development including data extraction, cleaning, loading and refreshing.
4) To understand various issues related to improvement in performance of data warehouse.

A student completing course unit 2 should:

1) Practice SQL & PL/ SQL required in data warehouse environment.
2) To master the basic range of techniques for creating, controlling, and navigating dimensional business databases, by being able to use a tool for dimensional modeling and analysis.
3) Understand multidimensional data model, OLAP, OLAP operations and work on OLAP queries

A student completing course unit 3 should:

1) Understand the fundamentals of data mining Data Mining Functionalities.
2) Have an understanding of the data mining process, its motivation, applicability, advantages and pitfalls.
3) Understand how to move from Data Warehousing to Data Mining,
4) Understand Issues and challenges in Data Mining.
5) Understand Data Mining Query Languages and Data Mining applications

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A student completing course unit 4 should:

1) Understand different data mining techniques.

2) Understand various algorithms to find association rules.

3) Have an understanding of the principles, methods, techniques, and tools that underpin successful data mining applications.

4) Understand different clustering techniques.

5) Understand data mining through Decision Trees, Neural networks and Genetic Algorithm.

A student completing course unit 5 should:

1) Understand what is Web Mining, Web content mining, Web Structure mining and to know the concept of Text mining.

2) Understand the concept of Temporal Data Mining, Spatial Data Mining.

3) Be able to understand the methods and techniques of Big Data Analytics.

Unit 1

Introduction: Data Warehouse, Evolution, Definition, Very large database, Application, Multidimensional Data Model, OLTP vs Data Warehouse, Warehouse Schema, Data Warehouse Architecture,
Data Warehouse Server, Data Warehouse Implementation, Metadata, Data Warehouse Backend Process: Data Extraction, Data Cleaning, Data Transformation, Data Reduction, Data loading and refreshing. ETL and Data warehouse, Metadata

Unit 2

Structuring/Modeling Issues, Derived Data, Schema Design, Dimension Tables, Fact Table, Star Schema, Snowflake schema, Fact Constellation, De-normalization, Data Partitioning, Data Warehouse and Data Marts.OLAP, Strengths of OLAP, OLTP vs OLAP, Multi-dimensional Data, Slicing and Dicing, Roll-up and Drill Down, OLAP queries, Successful Warehouse, Data Warehouse Pitfalls, DW and OLAP Research Issues, Tools. SQL Extensions, PLSQL.

Unit 3

Fundamentals of data mining, Data Mining definitions, KDD vs Data Mining, Data Mining Functionalities, Issues and challenges in Data Mining. Data Mining Primitives, Descriptive and Predictive Data mining, Data Mining applications-Case studies. Association rules: Methods to discover association rules. Various algorithms to discover association rules like A Priori Algorithm. Partition, Pincer search, Dynamic Itemset Counting Algorithm etc

Unit 4

Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Algorithms, Hierarchical and Categorical clustering, Decision Trees, Neural networks, Genetic Algorithm, SVM, Regression

Unit 5

Web Mining , Web content mining, Web Structure mining, Text mining, Temporal Data Mining, Spatial Data Mining, Introduction to Big Data Analytics

Text Book(s)

1. Data Mining Techniques – ARUN K PUJARI, Second Edition, University Press,2001
2. Data Mining-Introductory and Advanced Topics-Margaret H. Dunham,
2. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
3. Building the Data Warehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd.Fourth Edition
4. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT Third Edition

Reference Material(s)

Essential References

1. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
2. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION
3. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION

Course Name MTech (CS) 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 concepts 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

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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.

CS-5010: Advanced Computer Architecture Assignments

1. Consider a workload where 50% of the execution time consists of multimedia processing for which the MMX instruction set extensions might be helpful. According to Amdahl's law, what is the maximum speedup that can be achieved by implementing them?
2. When pipelined microprocessors were first becoming more common (early to mid 80's) designers believed that RISC instruction sets were easier to pipeline because...?
3. We have seen how pipelining improves the instruction throughput increasing effective performance. Machines with deeper pipelines perform less work per pipestage but have more "in-flight" instructions processing at the same time allowing instructions to complete at a higher rate. In class we discussed several reasons why the effectiveness of deeply pipelined machines can be limited – too much pipelining can be detrimental. Describe two reasons here.
4. List and explain three types of pipeline hazards.
5. List and explain three types of cache misses.
6. Implement a simulator for Beta machine.

CS-5413: Data Mining and Warehousing

ASSIGNMENTS and LAB Manual :

1. Search a voluminous data file and understand it.(hint: you may get free data from internet)
2. Replace all tabs with commas from file or vice versa.
3. Normalize the data: for each value, set the minimum value to 0 and the maximum to 100.
4. Transform the data file (text, excel etc) into database.
5. Create a subject oriented data warehouse.
6. Analysis of existing data (semantical correctness, completeness)
7. Use of free ETL tool.
8. Use of data mining algorithms.
9. Describe an application area where data mining algorithms can be applied. Description should contain application scenario, scale of the problem, existing approach, data mining algorithm that can be used and the benefits of using the algorithms, Prepare data mining models.

Note: Extra assignments may be provided in classroom.

PROJECT (Any One for one team):

Data mining application using any freeware data mining tool.

Deliverables:

a. **Project proposal**: A one-page description of what you plan to do for your project, due Nov. 1st. Please include:
   i. Who is in your group
   ii. Project title
   iii. Brief description of the problem you'll solve or the question you'll investigate
   iv. What data you'll use and where you'll get it
   v. Which algorithms/techniques you plan to use

b. **Final project write up** This is a comprehensive description of your project. You should include the following:

   1. Project idea
   2. Details of data
   3. ETL and Data mining implementation
   4. Key results and metrics of your system

c. **Final presentation**: In the last week of class , each team will present their project to the rest of the class. The presentation should not be more than 15 minutes.

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.

SYLLABUS

M.Tech. (NETWORK MANAGEMENT & INFORMATION SECURITY)

1st SEMESTER

Session 2020 - 2021

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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.

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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

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Objectives

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2.To develop concept in a logical and creative way.

Learning Outcomes

Description of knowledge to be acquired:
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1. Have an understanding of basics of coding with syntax.
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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 :
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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.
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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

MTech (NM & IS) 1st SEM Session 2020 - 2021

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.

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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.

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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.

SYLLABUS

MTech (CS)

2nd 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 (CS) 2nd Semester
Subject Code: CS-6711
Subject Name: Soft Computing

Aim of the Subject

The aim of the course is to give students a good understanding of introduction to the basic principles, techniques, and applications of Soft Computing.

Objectives

1. Learn Soft Computing techniques and their applications.
2. Learn and understand Fuzzy logic and its applications.
3. Analyze Genetic Algorithms and their applications.
4. Gain an understanding of Neural Network theory and its applications.
5. Apply different Soft Computing techniques to solve problems.

Learning Outcomes

After completion of the course, the students will be able to:

1. Understand Fuzzy logic and its applications.
2. Solve single-objective optimization problems using Genetic Algorithms.
3. Solve multi-objective optimization problems using Evolutionary algorithms (MOEAs).
4. Understand Artificial Neural Networks and its applications.
5. Apply different Soft Computing techniques to solve problems.

Unit 1

Introduction to Soft Computing: Soft Computing concepts, Differences between Soft Computing and Hard Computing, Soft Computing constituents. Fuzzy logic: Definition, Applications. Genetic Algorithms: Definition, Applications, Neural Networks: Definition, Applications, Hybrid Systems: Definition, Types.

Unit 2

Fuzzy Sets and Fuzzy Logic: Introduction to Classical Sets and Fuzzy Sets. Classical set and Fuzzy sets – Operations and Properties. Fuzzy Relations – Equivalence and Tolerance, Membership Functions, Fuzzification, Membership Value Assignment. Fuzzy to Crisp Conversion, Defuzzification, Fuzzy Arithmetic, Fuzzy Logic and Approximate Reasoning, Rule Based Systems and Rough Sets.

Unit 3

Elementary Search techniques: Uninformed Search Techniques-Breadth First Search, Depth First Search, Depth first Iterative Deepening, Bidirectional Search. Heuristic Search Techniques - Best First Search, Hill Climbing Search, A*, AO*, Means-ends Analysis, Constraint Satisfaction. Advanced search using Genetic Algorithm (GA) - Introduction to Genetic Algorithms (GA), Representation, Operators in GA, Fitness function, population, Multi-objective GA, Applications of GA.

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Unit 4

Artificial Neural Networks: Basics of Neural Networks, Biological Neural Networks, McCulloch Pitt model, Supervised Learning algorithms: Perceptron (Single Layer, Multi-layer), Linear separability, Delta learning rule, Back Propagation algorithm, Un-Supervised Learning algorithms: Hebbian Learning.

Unit 5

Hybrid Systems: Integration of Neural Networks, Fuzzy Logic and Genetic Algorithms, GA Based Back propagation Networks, Fuzzy Back Propagation Networks, Fuzzy Associative Memories, ANFIS: Adaptive Neuro-Fuzzy Inference Systems.

Text Book(s)

1. Samir Roy, Udit Chakraborty, Soft Computing: Neuro-Fuzzy and Genetic Algorithms, Pearson India,2013.

Reference Material(s)

1. S.N. Deepa, S.N. Sivanandam, Principles of Soft Computing (Second Edition), Wiley India Pvt. Ltd.,2011.

Course Name MTech (CS) 2nd Semester
Subject Code: CS-6630
Subject Name: Internet of Things

Aim of the Subject

To impart knowledge with a solid theoretical foundation, and strong practical skills in the fields of computer technology, communications networks and IT, that are required to develop a wide range of IoT applications.

Objectives

- To cover all concepts of IoT
- To explore various applications of IoT
- To provide understanding of technologies involved in IoT
- To acquaint with Data Modelling and Security requirements in IoT environment
- To experiment on mutiple sensors using Microcontroller/Microprocessor

Learning Outcomes

Upon completing the course, students will be able to:

- Understand IoT concept
- Gain knowledge of IoT Applications and Examples
- Understand Technologies involved in IoT
- Get insight of Data Modelling in IoT
- Learn Security models in IoT
- Explore and learn about IoT with the help of preparing projects designed with the Arduino

Unit 1

Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view.
Technology involved - Server-end technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of IoT, Advantages and Disadvantages of IoT.
Machine-to-Machine Communication: Definition, M2M Vs. IoT, M2M architecture.

Unit 2

Design principles for connected devices: Communication Technologies – Near-field communication, RFID, Bluetooth, Zigbee (ZigBee IP/ZigBee SE 2.0), Wi-Fi, GPRS/GSM cellular Networks-Mobile Internet.

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Design principles for web connectivity: Constrained Application Protocol (CoAP), MQTT, XMPP.
Data formats: JSON, XML, TLV, MIME.
Connectivity Models: Request/Response, Publish/Subscribe, Pull/ Push Data, Message cache, Message queue.
Gateway Protocols for Web Connectivity: HTTP, SOAP, REST, RESTful HTTP and WebSockets.

Unit 3

Data Acquiring: Data generation, Data Acquisition, Data validation, Data categorization for storage, Data Store – definition, Key/value store, Document store, tabular store (Column Family & Big Table), Object store, Graph Stores-Graph Databases
Data Organizing: Definition, DBMS-ACID rules, Distributed database, CAP theorem , Query processing, SQL, NoSQL, ETL, MPP, in-memory databases , columnar database.

Unit 4

Data Processing: Definition, Online tractions and processing (OLTP), Stream processing, Real-Time processing, Event Stream processing, Business process, Business Intelligence, Distributed Business Process, Enterprise Systems, Service Oriented Architecture(SOA).
Data Analytics: Definition, Analytics phases- Descriptive, Predictive, Prescriptive), Online analytical processing (OLAP), Statistical tools for data analysis -descriptive and inferential statistics, random analysis, sampling concept, Sampling distribution techniques, statistical inference, regression analysis.
Machine Learning basics: Supervise and un-supervised techniques,
Big Data analytics - Big data definition, Characteristics, Big data Classifications on the basis of: sources, format, stores, analysis, type, users, rate.
Big data Analytics: Architecture, Hadoop components, Berkley Data Analytics Stack (BDAS) Architecture.
Knowledge Management: Definition, Knowledge Management Reference Architecture.

Unit 5

Cloud Storage models and communication APIs for IoT, IoT Privacy, Security and Vulnerabilities Issues and Solutions, Prototyping and designing the software for IoT applications, Interoperability in IoT.
Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino.
IoT Case Studies: Agriculture, Healthcare, SCM, Connected Cars, Smart city, Smart Home.

Text Book(s)

1. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Thing”, Wiley
2. Rajkamal, “Internet of Things: Architecture and Design Principles”, McGraw Hill Education, 2017.

Reference Material(s)

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
2. Dr. Ovidiu Vermesa

Course Name MTech (CS) 2nd Semester
Subject Code: CS-6517
Subject Name: Advanced Compiler Design

Aim of the Subject

To learn basic principles and advanced techniques of compiler design, and implement them at each phase of a compiler.

Objectives

- To explore exiting tools for lexical and syntax analysis.
- To understand various paring techniques and implement them.
- To review code optimization strategies and use them at code generation.

Learning Outcomes

At this level, the students will be able to understand techniques used at Lexical, Syntactic, Semantic, Intermediate code generation and Code optimization level and their implementation using suitable algorithms and existing programming tools as well. And hence, they will have the insight of overall working and performance of the compilers.

Unit 1

Compiler, Translator, Interpreter, Assembler definition, Types of compiler, Phases of compiler, one pass and multi pass compilers. Analysis of source program. Review of Finite automata, lexical analyzer, Input, buffering, Recognition of tokens, LEX: A lexical analyzer generator, Error handling.

Unit 2

Introduction to parsing. Bottom up and Top down parsing techniques- Shift reduce, Operator precedence, Recursive descent and predictive parsers. LL grammars and parsers, error handling in LL parser. LR parsers,Construction of SLR, .CanonicalLR and LALR parsing tables.

Unit 3

Syntax directed definitions and translation: Construction of syntax trees, L~attributed definitions, Intermediate code forms using postfix notation and three address code. Representing TAC using triples and quadruples, Translation of assignment statement. Boolean expression and control structures etc.

Unit 4

Definition of basic block control flow graphs, DAG representation of basic block. Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization.

Unit 5

Issues in design of code generator, A simple code generator, Code generation from DAG. Code Optimization.

Text Book(s)

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman (2007), Compilers Principles, Techniques and Tools, 2nd edition, Pearson Education, New Delhi, India.
2. Engineering a Compiler, Keith D. Cooper, Linda Torczon (2012), Second Edition, Elsevier.

Reference Material(s)

1. Alfred V. Aho, Jeffrey D. Ullman (2001), Principles of compiler design, Indian student edition, Pearson Education, New Delhi, India.
2. Kenneth C. Louden (1997), Compiler Construction– Principles and Practice, 1st edition, PWS Publishing.
3. Andrew

Course Name MTech (CS) 2nd Semester
Subject Code: CS 6418
Subject Name: Advanced Database Management System

Aim of the Subject

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.

Objectives

The course objectives are to:

- To build strong foundation of query languages through relational algebra, calculus & QBE
- Design conceptual, logical database model and physical model.
- Develop SQL proficiency on simple & advanced features
- Learn database design techniques through normalization
- Learn advanced database functions like concurrency, transaction processing, recovery in multi user environment
- Acquire necessary skills for NoSQL based database application development
- Exposure to graph, spatial, and temporal databases

Learning Outcomes

The course objectives are to:

- To build strong foundation of query languages through relational algebra, calculus & QBE
- Design conceptual, logical database model and physical model.
- Develop SQL proficiency on simple & advanced features
- Learn database design techniques through normalization
- Learn advanced database functions like concurrency, transaction processing, recovery in multi user environment
- Acquire necessary skills for NoSQL based database application development
- Exposure to graph, spatial, and temporal databases

Unit 1

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

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relation, Relational databases, Various types of keys: candidate, primary, alternate & foreign keys.

Unit 2

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.
Overview of Graph & Spatial Databases

Unit 3

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, multivalue 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 4

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

Unit 5

Query processing, optimisation & NOSQL

Text Book(s)

DBMS By Sudarshan & Korth

Reference Material(s)

Internet material & e books for advanced topics

Course Name MTech (CS) 2nd Semester
Subject Code: CS-6712
Subject Name: Data Science

Aim of the Subject

This course aims to provide sound foundation to fundamental concepts of Data Science and its application and prepare students for advanced research and real time problem solving in Data Science.

Objectives

1. Ability to understand, analyze and design solutions with professional competency for the real-world problems.
2. Ability to develop software solutions for the requirements, based on critical analysis and research.

Learning Outcomes

1. Understand the fundamental concepts of data analytics.
2. Evaluate the data analysis techniques for applications handling large data.
3. Demonstrate the various machine learning algorithms used in data analytics process.

Unit 1

Introduction: What is Data Science?, The Data Science Process, Different Types of Data:
Quantitative, Categorical. Graphical Summaries of Data: Pie Chart, Bar Graph, Pareto Chart, Histogram. Measuring the Center of Quantitative Data: Mean, Median, Mode. Measuring the Variability of Quantitative Data: Range, Standard Deviation, and Variance.

Unit 2

Overview of R, R data types :Vectors, Matrices, Factors, Lists, Data Frames, reading and writing data, Control structures, functions, scoping rules, dates and times

Unit 3

Introduction to Data Cleansing, Missing and Repeated Values, Feature Engineering, Outliers and Errors, Finding Outliers, Cleaning Data with R.

Unit 4

Machine Learning : Definition and overview, Regression, Simple Linear Regression, Multiple Regression, Assessing Performance, Ridge Regression, Feature Selection & Lasso, Nearest Neighbors & Kernel Regression

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Unit 5

Machine Learning : Classification, Linear Classifiers & Logistic Regression, Learning Linear Classifiers, Overfitting & Regularization in Logistic Regression, Decision Trees, Handling Missing Data, Boosting.

Text Book(s)

[1] Allan G. Bluman, Elementary Statistics: A Step By Step Approach,10th Edition,McGraw-Hill, 2017.
[2] Paul Teetor, R Cookbook, First Edition, O,ReillyMedia, 2011.
[3] Tom Mitchell, Machine Learning, First Edition, McGraw Hill. 1997

Reference Material(s)

MOOCS of Coursera

Course Name MTech (CS) 2nd Semester
Subject Code: CS 6518
Subject Name: Cloud Computing

Aim of the Subject

to introduce concepts related to the analysis, design and implementation of computation and storage clouds.

Objectives

comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations

Learning Outcomes

1. Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
2. Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
3. Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
4. Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit 1

OVERVIEW OF COMPUTING PARADIGM AND INTRODUCTION TO CLOUD COMPUTING: Recent trends in computing, evolution of cloud computing, Cloud computing (NIST model), properties, characteristics and disadvantages, role of open standards. Service models (XAAS), Deployment models

Unit 2

INFRASTRUCTURE AS A SERVICE: Introduction, Hypervisors, Resource virtualization, examples.

Unit 3

PLATFORM AS A SERVICE and Software-as-a Service :Introduction, Cloud Platform and Management, examples.Introduction to SaaS, , Web services, Web OS, examples

Unit 4

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SERVICE MANAGEMENT IN CLOUD COMPUTING: Service Level Agreements (SLAs), Billing & Accounting, Comparing scaling hardware, economics of scaling, managing data

Unit 5

CASE STUDY ON OPEN SOURCE AND COMMERCIAL CLOUDS: CLoudSIm, HDFS and MapReduce, Amazon, Microsoft Azure etc.

Text Book(s)

1. Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski: "Cloud Computing: Principles and Paradigms", Wiley, 2011

Reference Material(s)

1. Nikos Antonopoulos, Lee Gillam: "Cloud Computing: Principles, Systems and Applications", Springer, 2012
2. Ronald L. Krutz, Russell Dean Vines: "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India, 2010
3. Tim Mather, Subra Ku

Course Name MTech (CS) 2nd Semester
Subject Code: CS-6623
Subject Name: Mobile and Wireless Systems

Aim of the Subject

To introduce the theory, architecture, protocols, techniques and applications in wireless and mobile networks.

Objectives

1. To familiarize students with wireless and mobile terminology.
2. To focus on several areas of wireless and mobile technologies including; Wireless LAN, Cellular Network, Ad-hoc Network and Satellite Communication.
3. To explain architecture and infrastructure for wireless and mobile systems.
4. To familiarize students how mobile phone systems work.
5. To make student understand the influence of mobility, security or IP networks.
6. To make student understand the design decisions of higher layer communication protocols and applications.
7. To expose students to emerging wireless technologies and their potential impact

Learning Outcomes

1 Acquaintance with communication systems & their applications.
2. Understanding of Wireless transmission techniques, infrastructure and devices.
3. Understanding of GSM Architecture, its working and concepts of cellular systems.
4. Understanding of Modulation Techniques, Multiplexing techniques, CDMA
4. Knowledge of channel allocation and co-channel Interference in cellular networks.
5. Application and uses of protocol and developing wireless LAN infrastructure.
6. Understanding of Mobile Ad-hoc network and Sensor networks, issues in efficient routing in MANET.
7. Developing concepts on Characteristics, classification of routing algorithms in MANET, Mobile operating System and applications.
8. Administration & management of mobile systems, security issues.

Unit 1

Overview of the emerging field of mobile computing: Historical perspectives (mainly from the perspective of radio), Land mobile vs. Satellite vs. In-building

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communications systems, RF vs. IR, Mobile applications, Limitations.
Mobile Radio Propagation: Introduction, Propagation mechanism, Path loss, Slow Fading, Fast Fading, Delay Spread, Inter-symbol Interference, Co-channel Interference.
Cellular Concept: Characteristic of Cellular Systems, Cell area, Capacity of a cell, frequency reuse, Reducing Co-channel Interference, Cell Splitting, Cell Sectoring.

Unit 2

Mobile communication: Fiber or wire based transmission, Wireless Transmission:
Frequencies, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques.
Channel Allocation: Fixed Channel Allocation, Dynamic channel Allocation, Hybrid Channel Allocation, Allocation in Specialized System Structure.
Mobile Communication Systems: Cellular System Infrastructure, Registration, Handoff in cellular Systems, Roaming support, Mobile IP, Multicasting, Generation of Mobile Systems, Existing Wireless Systems, Case Study on GSM and CDMA.

Unit 3

Satellite Systems: Types of Satellite Systems, Characteristic of Satellite Systems,
Satellite System Infrastructure, Call Setup, Global Positioning System, limitations and beneficiaries of GPS.

Unit 4

Ad Hoc and Sensor Networks: Characteristic of MANETs, Applications, Need of
Routing, Routing Classification, Wireless Sensor Networks.

Unit 5

Wireless LANs and PANs: IEEE802.11, HIPERLAN, Bluetooth. Case Study on Wireless LAN infrastructure, Wireless security.

Text Book(s)

1. Jochen Schiller, Mobile Communications, John Willy & Sons, Ltd.
2. D. P. Agrawal and Qing-An zeng, Introduction to Wireless and Mobile Systems, Thomson publication.

Reference Material(s)

1. P. Nicopotidis, Wireless Networks, Addision –Wesley publication.
2. Raj Kamal, Mobile Computing, Oxford University press, 2007.
3. U. Hansmann, L. Merk, M.S. Nicklons and T. Stober, Principles of Mobile Computing, Springer, 2003.
4. R.

School of Computer Science & IT

Devi Ahilya University, Indore

Short answer review questions

MTech II Sem - Advanced Database management Systems

by Dr Sanjay Tanwani, Prof & Head,

What is database?

What is difference between database & DBMS?

What are DB applications?

What is a file?

What are the problems with conventional file systems?

What is a text file? How it differentiates from binary file?

What is data redundancy & inconsistency?

What is data isolation? How multiple formats are isolated from programs?

What are integrity constraints?

Differentiate between data verification & validation.

What is a transaction?

What are ACID properties of a transaction?

Why it is important to ensure atomicity? How it is implemented?

What is durability of a transaction? How it is ensured?

What is isolation property is not maintained in a transaction?

What is concurrency? Why it is needed?

Why we need control over concurrency?

What are the ways to control concurrency?

What is serializability? How serializable schedules are prepared?

How time stamp based protocol ensures serializability of transactions?

What are locks? Differentiate between shared & exclusive locks?

What are deadlocks in a lock based protocol?

How the deadlocks are detected, prevented and eliminated in a lock based concurrency control system?

Define security? How databases are secured?

What are illegal login attempts? How they are detected?

What are system logs?

Differentiate between authorization & authentication.

What are different authentication techniques?

What are authorizations? How authorizations are made in a database?

What is DDL? How assertions & constraints are defined in DDL?

What is DCL? How authorization is done using DCL?

What is query processing? What are its steps?

How select operator is implemented in relational algebra?

How join is implemented between two tables?

What is query optimization?

What is role and responsibilities of DBA?

What is XML? How XML is stored in a database?

Define relation and its attribute.

Define null. How it is represented?

What is key? Differentiate between super, candidate & primary key.

What is foreign key? What is its purpose?

What are pure languages?

How pure languages build the foundations of commercial query languages?

Define levels of abstraction.

Differentiate between logical & physical level with an example.

Differentiate between logical & view level with an example.

What is schema? Differentiate between logical & physical schema.

Define schema instance, physical data independence.

What is data model? Is relational data model better than network or hierarchical model

What is an ER model?

What is object based ER model?

What is DML? Differentiate between procedural & nonprocedural aspects of SQL.

What is SQL? Is it procedural or nonprocedural?

What are six basic operators of relational algebra?

What are unary operators of relational algebra?

What is difference between Cartesian product & division in relational algebra?

When is project operation useful?

What is an arity of a relation?

Define rename operator. How it is used?

What is equivalent of rename in SQL? Explain with an example.

What is natural join? How it is different from other joins?

Differentiate between left & right outer join.

What is an assignment? How it differs from rename operation?

What are aggregate functions in relational algebra? Why use of aggregate functions is not permitted in where condition clauses?

What is generalized projection?

What is null value? How aggregate functions handle null values?

What are main features of SQL?

What are domain types in SQL?

How integrity constraints are defined in create table?

How can we add new attributes in an existing table?

Differentiate between distinct and all in context of SQL.

How the keyword like is used in string matching in SQL?

What % and underscore(_) represent in string matching?

Explain string operations like concatenation, string length, extract substring from a string in SQL.

How order by clause is used in SQL?

How to arrange data items in ascending or descending order in SQL?

What keyword is used to retain duplicated in union, intersect & except operations in SQL?

How group wise aggregate functions are performed in SQL?

Differentiate between where and having clause of SQL.

Differentiate between all, some and any construct of SQL.

How to test for empty relations?

Explain exists with an example.

What are views? When are they useful?

What is difference between date timestamp data type?

How can you create user defined data type in SQL?

How large objects are stored? What are data types to support LOBs?

What are assertions? How are they applied in SQL?

How authorization is specified in SQL?

Define embedded & dynamic SQL

Differentiate between ODBC & JDBC.

What is prepared statement?

Name all meta data features of JDBC.

What is a resultset?

What are stored procedures & triggers in SQL?

What is database modeling?

What artifact is used for modeling databases?

Define various symbols used in ER Model.

What is a weak entity set? What is role of discriminator in weak entity set?

What are extended ER features?

What is attribute inheritence?

Differentiate between specialisation & generlization

What is completeness constraint?

What is aggregation in EER Diagram?

How total participation of entity in a relation ship set is represented?

How identifying relationship set for weak entity is represented?

What is normalization? What are its goals?

What are features of a good DB design?

What is 1NF, 2NF & 3NF?

Why atomicity of attributes is important?

What is functional & multi-valued dependency?

What is difference between lossy & lossless decomposition?

What is BCNF?

Differentiate between 4NF & BCNF.

Explain storage structure of hard disk in terms of block, sector, track, and cylinder.

Define seek, latency & access time of a hard disk.

Define checksum and remapping of bad sectors in hard disk.

Define sequential file organisation?

What is fragmentation in files? Why it needs to be removed?

Define RAID 0, 1 & 5.

Define hot swapping

What are database buffers? Why they are needed?

What are buffer replacement strategies?

Differentiate between fixed-length record and variable length record file formats implemented with a linked structure.

How files are stored in hard disk in sequential file organization?

Differentiate between sparse & dense indices.

Define multi level index.

What are B+ tree index files? How they are used for creating indices?

Define clustered index.

Differentiate between indexing and hashing.

Define hash, hash function, collision & its resolution.

How bucket overflow is handled in hashing?

What is query cost? How it is computed?

How selections with compound conditions are evaluated?

Differentiate between index-nested loop & hash join.

How duplicates are eliminated in the result given by a query?

Define evaluation plan.

How will you propose the order of evaluation in a join of three tables?

What are the states of a transaction? Explain using state transition diagram.

What are levels of consistency in SQL-92?

What are SQL keywords for transaction definition begin end or revert, if failure?

What is a timestamp?

How a time stamp based protocol ensures serializability?

Explain read & write algorithm of a shared data item in case of time stamp based protocol.

What are two phases of 2Pl locking protocols?

What is the meaning of granularity of data items?

Explain basic principle of validation based protocol.

Explain protocol based on multi version schemes.

In context of recovery, describe various types of failures.

Explain log based recovery to ensure atomicity.

Differentiate between shadow-paging and log-based recovery.

differentiate between deferred and immediate database modification for log-based recovery.

What are checkpoints in recovery process?

Assignments

1. Write a R program to take input from the user (name and age) and display the values. Also print the version of R installation.

2. Write a R program to get the details of the objects in memory.

3. Write a R program to create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91.

4. Write a R program to create a vector which contains 10 random integer values between -50 and +50.

5. Write a R program to get the first 10 Fibonacci numbers.

6. Load the built in warpbreaks data set . Find out, in a single command, which columns of warpbreaks are either numeric or integer.

7. a Load the state datasets.
b. Convert the state.x77 dataset to a dataframe.
c. Rename the Life Exp variable to Life.Exp, and HS Grad to HS.Grad

8. Suppose we wanted to enter all the variables in a first-order linear regression model with Life Expectancy as the dependent variable. Fit this model.

9. Suppose we wanted to remove the Income, Illiteracy, and Area variables from the model in Exercise 2. Use the update function to fit this model.

10. Let's assume that we have settled on a model that has HS.Grad and Murder as predictors. Fit this model.

11. Write a R program to create a Data Frames which contain details of 5 employees and display summary of the data.

12. Write a R program to create the system's idea of the current date with and without time.

13. How do you prepare data for analysis in R?

14. How do I find missing data in R?

15. How do I exclude missing data in R?

16. How do I remove rows with 0 in R?

17. Create a list of 80% of the rows in the original dataset to use for training.

18. Select 20% of the data for validation.

19. Use the remaining 80% of data to train and test the models.

20. Find the dimensions of the “iris” dataset.

21. Find the type of each attribute in your dataset.

22. Take a look at the first 5 rows of your dataset.

23. Display the summary of the “iris” dataset.

24. What happens to missing values in a histogram? What happens to missing values in a bar chart? Why is there a difference?

CS-6711 Soft Computing

List of Assignments:

Fuzzy Sets and Fuzzy Logic

1. Write a program in to perform Union, Intersection and Complement operations.
2. Write a program in to implement De-Morgan's Law.
3. Write a program in to plot various membership functions.
4. Design a Fuzzy Inference System using Fuzzy toolbox to model tip value that is given after a dinner which can be-not good, satisfying, good and delightful and service which is poor, average or good and the tip value will range from Rs. 10 to 100.
5. Design a fuzzy controller for a train approaching or leaving a station. The inputs are the distance from the station and speed of the train. The op is amount of brake power used. Use four descriptors each for input and output and design using Mamdani's fuzzy model. Derive a set of rules for control action and defuzzification. The design should be supported by figures. Prove that if the train is at a short distance with great speed the brake power required would be very high and vice versa.

Genetic Algorithm (GA)

6. Write a program in to implement Genetic Algorithm Life Cycle.
7. Write a program in to solve 0-1-knapsack-problem by using Genetic-Algorithm.

Artificial Neural Networks

8. Write a program to generate ANDNOT function using McCulloch-Pitts neural net.
9. Write a program to generate XOR function using McCulloch-Pitts neural net.
10. Write a program to implement Hebb's Rule.

Hybrid Systems

11. Soft Computing has enormous applications areas such as medical diagnosis, computer vision, hand written character recondition, pattern recognition, machine intelligence, weather forecasting, network optimization, VLSI design, etc. Discuss and list out design principles of any application to solve any real-life problem.

References:

1. S.N. Deepa, S.N. Sivanandam, Principles of Soft Computing (Second Edition), Wiley India Pvt. Ltd., 2011.
2. Samir Roy, Udit Chakraborty, Soft Computing: Neuro-Fuzzy and Genetic Algorithms, Pearson India, 2013.

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PRACTICAL ASSIGNMENTS

- Explore exiting tools for lexical analysis such as LEX, Flex, jFlex.
- Design & develop character manipulator and scanner for building up tokens, given a piece of source code in any high level language of interest.
- Implement Operator Precedence Parsing algorithm with a set of well-defined operators and precedence relation table.
- Construct SLR(1) parser using algorithm for generating canonical collection of items, given a sample source comprised of at least 2-3 statements of source language.
- Develop CLR(1) and LALR(1) parsers for the above.
- Write a program for translation of some constructs of any source language into their equivalent 3-address code.
- Write a program for analyzing various strategies used for optimizing space and time complexity.

SYLLABUS

MTech (CS) Executive

2nd 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 Exec (CS) 2nd Semester
Subject Code: CS-6712
Subject Name: Data Science

Aim of the Subject

This course aims to provide sound foundation to fundamental concepts of Data Science and its application and prepare students for advanced research and real time problem solving in Data Science.

Objectives

1. Ability to understand, analyze and design solutions with professional competency for the real-world problems.
2. Ability to develop software solutions for the requirements, based on critical analysis and research.

Learning Outcomes

1. Understand the fundamental concepts of data analytics.
2. Evaluate the data analysis techniques for applications handling large data.
3. Demonstrate the various machine learning algorithms used in data analytics process.

Unit 1

Introduction: What is Data Science?, The Data Science Process, Different Types of Data:
Quantitative, Categorical. Graphical Summaries of Data: Pie Chart, Bar Graph, Pareto Chart, Histogram. Measuring the Center of Quantitative Data: Mean, Median, Mode. Measuring the Variability of Quantitative Data: Range, Standard Deviation, and Variance.

Unit 2

Overview of R, R data types :Vectors, Matrices, Factors, Lists, Data Frames, reading and writing data, Control structures, functions, scoping rules, dates and times

Unit 3

Introduction to Data Cleansing, Missing and Repeated Values, Feature Engineering, Outliers and Errors, Finding Outliers, Cleaning Data with R.

Unit 4

Machine Learning : Definition and overview, Regression, Simple Linear Regression, Multiple Regression, Assessing Performance, Ridge Regression, Feature Selection & Lasso, Nearest Neighbors & Kernel Regression

Unit 5

Machine Learning : Classification, Linear Classifiers & Logistic Regression, Learning Linear Classifiers, Overfitting & Regularization in Logistic Regression, Decision Trees, Handling Missing Data, Boosting.

Text Book(s)

[1] Allan G. Bluman, Elementary Statistics: A Step By Step Approach,10th Edition,McGraw-Hill, 2017.
[2] Paul Teetor, R Cookbook, First Edition, O,ReillyMedia, 2011.
[3] Tom Mitchell, Machine Learning, First Edition, McGraw Hill. 1997

Reference Material(s)

MOOCS of Coursera

Course Name MTech Executive CS 2nd Semester
Subject Code: CS-6223
Subject Name: Python Programming

Aim of the Subject

To provide students with a rigorous theoretical as well as practical grounding for programming in Python programming language.

Objectives

- Fundamental understanding of programming in Python.
- To create a variety of scripts.
- To understand built-in and external module and standard libraries of Python 3.
- To realize the ease of programming in Python.
- To focus on best practices such as Python featured programming, data preprocessing, and working with datasets.

Learning Outcomes

Upon successfully completing this course, students will be able to

- Identify/characterize/define a problem
- Design a program to solve the problem
- Create executable code
- Read most Python code
- Working with datasets

Unit 1

Introduction to Python Programming Language: Why and for What Python? Built-in Data Types, Variables, Strings and String methods, Numbers, Basic Input, Output and String formatting, Python literals, Operators: Arithmetic, Comparison, Assignment, Logical, Bitwise, Membership, and Identity, Comments, First Python program, Styling Python code.

Unit 2

List: Basic List operations, Indexing, Slicing, and Matrixes, organizing a list, Working with list and a part of a list, Tuple, Conditional Execution, Boolean Expressions, Conditional Statements with Lists, List Comprehension Expression, While and For Loop, Iterations, Documentation Interlude.

Unit 3

Working with Dictionaries, Functions: How functions communicate with their environment? Returning a result from function, Introduction to Scopes, Arguments, and Comprehensions and Generators.

Unit 4

Introduction to Modules and Packages, some useful Modules, Object-Oriented Programming Concepts: Classes and Objects/Instances, Working with Files, Exception Handling: Anatomy of Exception, Some useful Exceptions.

Unit 5

Python Libraries, Introduction to Scipy, Numpy, MatPlotLib, Scikit-Learn and Pandas, Data Preprocessing, Manipulation, and Visualization, Produce Python code to statistically analyze a Dataset.

Text Book(s)

1. Think Python First Edition, by Allen B. Downey
2. Learning Python Fifth Edition, By Mark Lutz

Reference Material(s)

SYLLABUS

MTech (NM & IS)

2nd SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

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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.

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Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS-6628
Subject Name: Legal Aspects of 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 Legal Aspects of Information Security.

Objectives

1. Explain the role of culture as it applies to ethics in information security.
2. Understand key provisions of information security and privacy laws.
3. Recognize different types of intellectual property laws.
4. Describe the functions of and relationships among laws, regulations, and professional organizations in information security.
5. Differentiate between laws and ethics.
6. Identify major national laws that affect the practice of information security.

Learning Outcomes

Upon successful completion of this course, the student will be able to

1. Understand the basic concepts of ethics.
2. Know the contribution of ethics in security and privacy of Information System.
3. Be aware of the technology used in the security of IS and regulations related to its implementation.
4. Describe the different methods of applying laws and regulations.

Unit 1

Computer Ethics Introduction: Introduction to Social and Ethical behavior, Computer Ethics, Morality and the Law. Ethics and Ethical Analysis: Reasoning and Decision Making, Ethics and the Professions: Professionalism and Ethical Responsibilities.

Unit 2

Privacy: Definition, Types of Privacy, Ethical and Legal Framework for Information, Workplace Privacy, Corporate Information Security and Privacy Regulation.

Unit 3

Intellectual Property Rights in Cyberspace: Definitions, Foundations of Intellectual Property-Copyrights, Patents, Trademarks, Trade Secrets.

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Unit 4

Computer Crimes: General Criminal Law Concepts, Common Criminal Laws Used in Cyberspace-The Computer Fraud and Abuse, Computer Trespass or Intrusion, Theft of Information, Interception of Communications, Spam and Phishing, Hacking, Identity Theft and Credit Card Fraud etc.

Unit 5

Information Technology Law: Evolution of the IT Act, Genesis and Necessity, Salient features of the IT Act, 2000, various authorities under IT Act and their powers: Penalties & Offences, amendments.

Text Book(s)

1. Kizza, Joseph Migga, " Ethical and Social Issues in the Information Age", Springer
London Dordrecht Heidelberg, New York, 2010, Fourth edition.
2. Grama, Joanna Lyn, "Legal and Privacy Issues in Information Security", Jones & Bartlett

Reference Material(s)

1. Baase, Sara, "A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology",
Prentice-Hall, USA, 2013, Fourth edition.
2. The Information Technology Act, 2000; Bare Act – Professional Book Publishers, New Delhi.

Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS-5618
Subject Name: Network Security

Aim of the Subject

To create security professionals who will be handling the real-life challenges and Problems the industry is facing today in connection with Networks.

Objectives

1.Understand the basic concepts of networks, networking devices and various attacks Possible on networking devices and data.
2. Students will be exposed to various tools for secure communications, threat
management and analytics.
3. Practice with an expertise in academics to design and implement security solutions.
4. Understand principles of web security and to guarantee a secure network by monitoring
and analyzing the nature of attacks through cyber/computer forensics software/tools.
5. Develop cyber security strategies and policies.

Learning Outcomes

1. Analyze and evaluate the cyber security needs of an organization.
2. Determine and analyze software vulnerabilities and security solutions to reduce the
risk of exploitation.
3. Measure the performance and troubleshoot cyber security systems.
4. Implement cyber security solutions and use of cyber security, information assurance,
and cyber/computer forensics software/tools.
5. Comprehend and execute risk management processes, risk treatment methods, and key
risk and performance indicators
6.Design operational and strategic cyber security strategies and policies.

Unit 1

Obstacles to Security
Security is inconvenient, Computer Are Powerful and complex, Computer User Are Unsophisticated, Computer Created without a Thought to Security, Current Trend is to

Share, Not Project Data Accessible from Anywhere security Isn't, Hardware and Software. The Bad Guys Are Very Sophisticated, Management Sees Security as a Drain
on the Bottom Line.
Ten Steps to Building a Secure Organization
Evaluate the Risks and Threats, Beware of Common Misconceptions, Provide Security Training for IT Staff-Now and Forever, Think Employees: Develop a Culture of Security Identify and Utilize Built-In Security Features of the Operating System and Applications, Monitor System, Hire a Third Party to audit Security, Don't Forget the Basics, Patch.

Unit 2

Internet Security
Internet Protocol Architecture: Communications Architecture Basics, An Internet Threat Model: The Dolev-Yoa Adversary Model Layer Threats, Defending Against Attacks on the Internet: Layer Session Defences, Session Stratup Defences
Botnet Problem
Botnet Overview, Origin of Botnets, Botnet Topologies and Protocols, Typical Bot Life, Cycle, The Botnet Business Model, Botnet Defence, Detecting and Removing Individual Bots, Detecting C&C Traffic, Detecting and Neutralizing C&C Channels,\Locating and identifying the Botmaster Botmaster Traceback: Traceback Challenges, Traceback Beyond the internet

Unit 3

Content Filtering
The Problem with Content Filtering, Categories, Issues and Problems with Content Filtering, Bypass and circumvention, Client –Based Proxies, Open Proxies, HTTP web-Based Proxies(Public and private),Secure Public Web-Based Proxies, Process Killing
Remote Pc Control Applications, Overblocking and Underblocking, Blacklist and Whitelist Determination, Casual Surfing Mistake, Getting the List Updated, Time-of-Day Policy Changing ,Override Authorization Methods, Hide Content in "Noise" or use Steganography, Detect Spyware and malware in the HTTP Payload, Scalability and Usability , Performance Issue, Technology and Techniques for Content-Filtering control ,Internet gateway-based Products Unified Threat Appliances
Virtual Private Network,
IPsec,,L2TP,L2TPv3,L2F,PPTP VPN,MPLS,MPVPN,SSH,SSL-VPN,TLS
Authentication Methods
Hashing, HMAC, MD5, SHA-1, Symmetric Encryption, Asymmetric Cryptography
Edge Devices, Password,

Unit 4

Instant-Massaging Security

The Evolution of Networking Technology, Game Theory and Instant Messaging, Your workforce, Generational Gaps, Transactions, The Nature of the Threat

Malicious Threat , Vulnerabilities, Man-in-the-Middle Attacks, Phishing and Social Engineering, Knowledge Is the Commodity, Data and Traffic Analysis, Unintentional Threats, Regulatory Concerns, Common IM Applications Consumer Instant Messaging, Enterprise Instant Messaging, Backdoor: Instant Messaging via Other Means(HTML),Mobile Dimension, Defensive Strategies: Asset Management, Built-in Security, Content Filtering, Classic Security, Compliance, Data Loss Prevention, Logging, Archival, Processes, Instant-Messaging Activation and Provisioning, Application Review, People, Revise ,Audit

Risk Management: The concept of risk, Expressing and Measuring Risk

The Risk Management Methology: Context Establishment, Risk Assement, Risk Treatment, Risk Communication, Risk Monitoring and Review, Integrating Risk Management into the System Development Life Cycle, Critique of Risk Management as a Methology, Risk Management Methods

Risk Management Laws and Regulations, Risk Management standards

Unit 5

Vulnerability Assessment

Why Vulnerability assessment, Penetration Testing Versus Vulnerability Assessment,

Vulnerability Assessment Goal, Mapping the Network, Selecting the Right Scanner Central Scans versus local Scans, Defence in Depth Strategy, Network Scanning Countermeasures, Vulnerability Disclosure Date, Find Security Hole before They Become Problem, Proactive Security versus Reactive Security, Vulnerability Causes, Conclusion.

Firewall, IDS/IPS, Honeypot

Text Book(s)

. 1.Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security”, Prentice Hall,

2nd edition, 2002, ISBN-10: 0130460192, ISBN-13: 978-0130460196.

2. Charles Pfleeger,” Security in Computing”, Prentice Hall, 4 th Edition, 2006, ISBN-10:

0132390779,

Reference Material(s)

1. Ulysess Black, ”Internet Security Protocols: Protecting IP Traffic”, Prentice Hall PTR;

1st edition, 2000, ISBN-10: 0130142492, ISBN-13: 978-0130142498.

2. Amir Ranjbar 2007, CCNP ONT Official Exam Certification Guide, Cisco Press [ISBN: 978-1-58720-

Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS-6623
Subject Name: Mobile and Wireless Systems

Aim of the Subject

To introduce the theory, architecture, protocols, techniques and applications in wireless and mobile networks.

Objectives

1. To familiarize students with wireless and mobile terminology.
2. To focus on several areas of wireless and mobile technologies including; Wireless LAN, Cellular Network, Ad-hoc Network and Satellite Communication.
3. To explain architecture and infrastructure for wireless and mobile systems.
4. To familiarize students how mobile phone systems work.
5. To make student understand the influence of mobility, security or IP networks.
6. To make student understand the design decisions of higher layer communication protocols and applications.
7. To expose students to emerging wireless technologies and their potential impact

Learning Outcomes

1 Acquaintance with communication systems & their applications.
2. Understanding of Wireless transmission techniques, infrastructure and devices.
3. Understanding of GSM Architecture, its working and concepts of cellular systems.
4. Understanding of Modulation Techniques, Multiplexing techniques, CDMA
4. Knowledge of channel allocation and co-channel Interference in cellular networks.
5. Application and uses of protocol and developing wireless LAN infrastructure.
6. Understanding of Mobile Ad-hoc network and Sensor networks, issues in efficient routing in MANET.
7. Developing concepts on Characteristics, classification of routing algorithms in MANET, Mobile operating System and applications.
8. Administration & management of mobile systems, security issues.

Unit 1

Overview of the emerging field of mobile computing: Historical perspectives (mainly from the perspective of radio), Land mobile vs. Satellite vs. In-building

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communications systems, RF vs. IR, Mobile applications, Limitations.
Mobile Radio Propagation: Introduction, Propagation mechanism, Path loss, Slow Fading, Fast Fading, Delay Spread, Inter-symbol Interference, Co-channel Interference.
Cellular Concept: Characteristic of Cellular Systems, Cell area, Capacity of a cell, frequency reuse, Reducing Co-channel Interference, Cell Splitting, Cell Sectoring.

Unit 2

Mobile communication: Fiber or wire based transmission, Wireless Transmission:
Frequencies, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques.
Channel Allocation: Fixed Channel Allocation, Dynamic channel Allocation, Hybrid Channel Allocation, Allocation in Specialized System Structure.
Mobile Communication Systems: Cellular System Infrastructure, Registration, Handoff in cellular Systems, Roaming support, Mobile IP, Multicasting, Generation of Mobile Systems, Existing Wireless Systems, Case Study on GSM and CDMA.

Unit 3

Satellite Systems: Types of Satellite Systems, Characteristic of Satellite Systems,
Satellite System Infrastructure, Call Setup, Global Positioning System, limitations and beneficiaries of GPS.

Unit 4

Ad Hoc and Sensor Networks: Characteristic of MANETs, Applications, Need of
Routing, Routing Classification, Wireless Sensor Networks.

Unit 5

Wireless LANs and PANs: IEEE802.11, HIPERLAN, Bluetooth. Case Study on Wireless LAN infrastructure, Wireless security.

Text Book(s)

1. Jochen Schiller, Mobile Communications, John Willy & Sons, Ltd.
2. D. P. Agrawal and Qing-An zeng, Introduction to Wireless and Mobile Systems, Thomson publication.

Reference Material(s)

1. P. Nicopotidis, Wireless Networks, Addision –Wesley publication.
2. Raj Kamal, Mobile Computing, Oxford University press, 2007.
3. U. Hansmann, L. Merk, M.S. Nicklons and T. Stober, Principles of Mobile Computing, Springer, 2003.
4. R.

Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS-6630
Subject Name: Internet of Things

Aim of the Subject

To impart knowledge with a solid theoretical foundation, and strong practical skills in the fields of computer technology, communications networks and IT, that are required to develop a wide range of IoT applications.

Objectives

- To cover all concepts of IoT
- To explore various applications of IoT
- To provide understanding of technologies involved in IoT
- To acquaint with Data Modelling and Security requirements in IoT environment
- To experiment on mutiple sensors using Microcontroller/Microprocessor

Learning Outcomes

Upon completing the course, students will be able to:

- Understand IoT concept
- Gain knowledge of IoT Applications and Examples
- Understand Technologies involved in IoT
- Get insight of Data Modelling in IoT
- Learn Security models in IoT
- Explore and learn about IoT with the help of preparing projects designed with the Arduino

Unit 1

Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view.
Technology involved - Server-end technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of IoT, Advantages and Disadvantages of IoT.
Machine-to-Machine Communication: Definition, M2M Vs. IoT, M2M architecture.

Unit 2

Design principles for connected devices: Communication Technologies – Near-field communication, RFID, Bluetooth, Zigbee (ZigBee IP/ZigBee SE 2.0), Wi-Fi, GPRS/GSM cellular Networks-Mobile Internet.

Design principles for web connectivity: Constrained Application Protocol (CoAP), MQTT, XMPP.
Data formats: JSON, XML, TLV, MIME.
Connectivity Models: Request/Response, Publish/Subscribe, Pull/ Push Data, Message cache, Message queue.
Gateway Protocols for Web Connectivity: HTTP, SOAP, REST, RESTful HTTP and WebSockets.

Unit 3

Data Acquiring: Data generation, Data Acquisition, Data validation, Data categorization for storage, Data Store – definition, Key/value store, Document store, tabular store (Column Family & Big Table), Object store, Graph Stores-Graph Databases
Data Organizing: Definition, DBMS-ACID rules, Distributed database, CAP theorem , Query processing, SQL, NoSQL, ETL, MPP, in-memory databases , columnar database.

Unit 4

Data Processing: Definition, Online tractions and processing (OLTP), Stream processing, Real-Time processing, Event Stream processing, Business process, Business Intelligence, Distributed Business Process, Enterprise Systems, Service Oriented Architecture(SOA).
Data Analytics: Definition, Analytics phases- Descriptive, Predictive, Prescriptive), Online analytical processing (OLAP), Statistical tools for data analysis -descriptive and inferential statistics, random analysis, sampling concept, Sampling distribution techniques, statistical inference, regression analysis.
Machine Learning basics: Supervise and un-supervised techniques,
Big Data analytics - Big data definition, Characteristics, Big data Classifications on the basis of: sources, format, stores, analysis, type, users, rate.
Big data Analytics: Architecture, Hadoop components, Berkley Data Analytics Stack (BDAS) Architecture.
Knowledge Management: Definition, Knowledge Management Reference Architecture.

Unit 5

Cloud Storage models and communication APIs for IoT, IoT Privacy, Security and Vulnerabilities Issues and Solutions, Prototyping and designing the software for IoT applications, Interoperability in IoT.
Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino.
IoT Case Studies: Agriculture, Healthcare, SCM, Connected Cars, Smart city, Smart Home.

Text Book(s)

1. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Thing”, Wiley
2. Rajkamal, “Internet of Things: Architecture and Design Principles”, McGraw Hill Education, 2017.

Reference Material(s)

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
2. Dr. Ovidiu Vermesa

Course Name MTech (NM & IS) 2nd Semester
Subject Code: CS 6518
Subject Name: Cloud Computing

Aim of the Subject

to introduce concepts related to the analysis, design and implementation of computation and storage clouds.

Objectives

comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations

Learning Outcomes

1. Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
2. Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
3. Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
4. Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit 1

OVERVIEW OF COMPUTING PARADIGM AND INTRODUCTION TO CLOUD COMPUTING: Recent trends in computing, evolution of cloud computing, Cloud computing (NIST model), properties, characteristics and disadvantages, role of open standards. Service models (XAAS), Deployment models

Unit 2

INFRASTRUCTURE AS A SERVICE: Introduction, Hypervisors, Resource virtualization, examples.

Unit 3

PLATFORM AS A SERVICE and Software-as-a Service :Introduction, Cloud Platform and Management, examples.Introduction to SaaS, , Web services, Web OS, examples

Unit 4

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SERVICE MANAGEMENT IN CLOUD COMPUTING: Service Level Agreements (SLAs), Billing & Accounting, Comparing scaling hardware, economics of scaling, managing data

Unit 5

CASE STUDY ON OPEN SOURCE AND COMMERCIAL CLOUDS: CLoudSIm, HDFS and MapReduce, Amazon, Microsoft Azure etc.

Text Book(s)

1. Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski: "Cloud Computing: Principles and Paradigms", Wiley, 2011

Reference Material(s)

1. Nikos Antonopoulos, Lee Gillam: "Cloud Computing: Principles, Systems and Applications", Springer, 2012
2. Ronald L. Krutz, Russell Dean Vines: "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India, 2010
3. Tim Mather, Subra Ku

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