SYLLABUS

MTech (CS)

1st SEMESTER

Session 2021-2022

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
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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 8085 microprocessor.
2. Measure the memory access performance of a processor, and tune cache design parameters to improve performance.
3. Analyze the condition of parallelism in parallel computing systems.
4. To gain knowledge about the cloud computing based models.

Unit 1

Parallel Computer Models: Elements of Modern Computer, Evolution of Computer Architecture, The Von Neumann Model, Flynn's Classification of Parallel computing structures, System attributes to performances, Instructions, Instruction Set Architecture (ISA), 8085 microprocessor, RISC, CISC Architecture, ISA Design, and Addressing Modes.

Unit 2

Multiprocessors and Multicomputer: Shared Memory Multiprocessors, UMA, NUMA, COMA, Distributed Memory Multiprocessor, Message Passing Scheme. Multivector and SIMD Computers: Vector Supercomputers and SIMD Supercomputers. Memory Hierarchy. Vector Processing, Array Processing and VLIW Architecture.

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Unit 3

Linear Pipeline Processors: Nonlinear pipeline Processors, Pipelining and its types, Data, control and Structural hazards and method to resolve them, Static RAM (SRAM), Dynamic RAM (DRAM), Cache coherence problem and method to resolve them: Write through and Write back. Cache coherence protocol: Snoopy and Directory based Protocol

Unit 4

Program and Network properties: Conditions of parallelism- Data dependency, control dependency, resource dependency. Bernstein Condition, Program partitioning and scheduling, program flow mechanisms, Hardware and Software parallelism. Interconnection Networks: Static and Dynamic networks such as Crossbar, multistage network etc. Introduction to parallel programming:- Parallel Programming Models – Parallel Languages and Compilers

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)

1. Computer Architecture & Parallel Processing by Kai Hwang and Briggs.
2. Advanced Computer Architecture by Kai Hwang.

Reference Material(s)

All notes are available as material in Google classroom.

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 Serve

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, PEAR

Course Name MTech (CS) 1st Semester
Subject Code: CS-6221
Subject Name: Advanced Algorithm Design

Aim of the Subject

The aim of the course is to make students learn & apply algorithmic techniques in problem solving.

Objectives

Objectives:

1. Understand algorithms & problem solving using various algorithm design techniques such as dynamic programming and greedy strategy.
2. Analyze time and space complexity of algorithms.
3. Applying algorithmic techniques in problem solving through case studies.

Learning Outcomes

Learning Outcomes:

1. Students will be able to design and implement algorithms to solve real world problems.
2. Student will be able to analyze time complexity and space complexity of algorithms.

Unit 1

Introduction to Algorithms, Time & Space Complexity, Sorting: Merge Sort, Quick Sort, Heap Sort; Searching: Linear Search, Binary Search, Hashing.

Unit 2

Dynamic Programming & its Applications: Fibonacci Computation, Longest Common Subsequence Problem, Edit Distance Problem; Greedy Techniques & its Applications: Knapsack Problem.

Unit 3

Graph Algorithms, Traversal: BFS, DFS; Shortest Path: Dijkstra's Shortest Path Algorithm; Computation of Minimum Spanning Trees: Prim Algorithm, Kruskal Algorithm.

Unit 4

String Matching Algorithms: Naive Algorithm, KMP Algorithm, Rabin-Karp Algorithm

Unit 5

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Theory of NP Complete Problems, P, NP, NP Hard, NP Complete and related Reductions, Cook's Theorem.

Text Book(s)

[1] Introduction to Algorithms, by Cormen, Leiserson, Rivest, and Stein, MIT Press, Third Edition, 2009. [CLRS]

Reference Material(s)

[1] Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw Hill Education, 2006.

SYLLABUS

MTech (CS)

2nd SEMESTER

Session 2021-2022

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

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-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-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-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.

SYLLABUS

MTech Exec (CS)

1st SEMESTER

Session 2021-2022

Mission of SCS&IT, DAVV

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

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Course Name MTech Exec (CS)1st Semester
Subject Code: CS-6418
Subject Name: Advanced Database Management Systems

Aim of the Subject

To develop computer applications and systems for real world problems using different kinds of databases.

Objectives

1. To make the students understand the advance database concepts for relational model.
2. To understand about usage of Query Optimization, Transaction management, and database administration techniques.
3. To the design and implement object oriented and distributed databases.
4. To make the students understand about data warehousing and data mining concepts in decision support system.

Learning Outcomes

1. To write complex queries including joins and able to apply normalization.
2. To design optimized queries and apply indexing and hashing concepts.
3. To the design and implement object oriented databases.
4. To the design and implement parallel and distributed databases.
5. To apply data mining and data warehousing concepts in real world applications.

Unit 1

Relational Databases:
Relational model concepts, Relational database schemas, Integrity Constraints, Functional Dependency, Multi-valued Dependency, Database Normalization, Normal Forms

Unit 2

Query Processing and Optimization:
Evaluation of Relational Operations, Transformation of Relational Expressions, Query Processing, Query Optimization, Indexing and Hashing, Transactions and concurrency control

Unit 3

Object Oriented and Object Relational Databases:
Modelling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

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Unit 4

Parallel and Distributed Databases:
Distributed Data Storage, Fragmentation & Replication, Location and Fragment Transparency, Distributed Query Processing and Optimization, Distributed Transaction Modelling and Concurrency Control, Distributed Deadlock, Commit Protocols.

Unit 5

Data Warehousing, Decision Support and Data Mining:
Introduction to decision support, OLAP, Multidimensional model, Window queries in SQL, Finding answers quickly, Implementation techniques for OLAP, Data Warehousing, Views and Decision support, View materialization, Maintaining materialized views.
Introduction to Data Mining: Concepts and techniques, Classification, Clustering, Fundamentals of Data Analytics.

Text Book(s)

1. A. Silberschatz, H. Korth, S. Sudarshan, Database system concepts, 5/e, McGraw Hill, 2008.
2. Ramez Elmasri & Shamkant B.Navathe, “Fundamentals of Database Systems”, Fourth Edition , Pearson Education , 2004.
3. Han Kamber, Data Mining: Concepts and Techniques,Morgan Kaufmann Publishers.

Reference Material(s)

1. Prabhu C.S.R., “Object Oriented Database Systems”, PHI, 2003.
2. Tamer Ozsu M., Patrick Ualduriel, “Principles of Distributed Database Systems”, Second Edition, Pearson Education, 2003.

Course Name MTech Exec (CS)1st Semester
Subject Code: CS-6221
Subject Name: Advanced Algorithm Design

Aim of the Subject

The aim of the course is to make students learn & apply algorithmic techniques in problem solving.

Objectives

Objectives:

1. Understand algorithms & problem solving using various algorithm design techniques such as dynamic programming and greedy strategy.
2. Analyze time and space complexity of algorithms.
3. Applying algorithmic techniques in problem solving through case studies.

Learning Outcomes

Learning Outcomes:

1. Students will be able to design and implement algorithms to solve real world problems.
2. Student will be able to analyze time complexity and space complexity of algorithms.

Unit 1

Introduction to Algorithms, Time & Space Complexity, Sorting: Merge Sort, Quick Sort, Heap Sort; Searching: Linear Search, Binary Search, Hashing.

Unit 2

Dynamic Programming & its Applications: Fibonacci Computation, Longest Common Subsequence Problem, Edit Distance Problem; Greedy Techniques & its Applications: Knapsack Problem.

Unit 3

Graph Algorithms, Traversal: BFS, DFS; Shortest Path: Dijkstra's Shortest Path Algorithm; Computation of Minimum Spanning Trees: Prim Algorithm, Kruskal Algorithm.

Unit 4

String Matching Algorithms: Naive Algorithm, KMP Algorithm, Rabin-Karp Algorithm

Unit 5

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Theory of NP Complete Problems, P, NP, NP Hard, NP Complete and related Reductions, Cook's Theorem.

Text Book(s)

[1] Introduction to Algorithms, by Cormen, Leiserson, Rivest, and Stein, MIT Press, Third Edition, 2009. [CLRS]

Reference Material(s)

[1] Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw Hill Education, 2006.

SYLLABUS

MTech Exec (CS)

2nd SEMESTER

Session 2021-2022

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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

4. To familiarize students how mobile phone systems work.

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

MTech Exec (CS) 2nd SEM Session 2021-2022

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 Exec (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

5. To make student understand the influence of mobility, security or IP networks.

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.

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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 Exec (CS)

3rd SEMESTER

Session 2021-2022

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.

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Course Name MTech Exec (CS) 3rd 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

MTech Exec (CS) 3rd SEM Session 2021-2022

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 Serve

Course Name MTech Exec (CS) 3rd 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 data centers to understand the trade-offs 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.

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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

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:
3. 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

SYLLABUS

MTech Exec (CS)

4th SEMESTER

Session 2021-2022

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.

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Course Name MTech Exec (CS) 4th 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 Exec (CS) 4th Semester
Subject Code: CS-6624
Subject Name: Network Management & Cyber Security

Aim of the Subject

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

Objectives

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

Learning Outcomes

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

Unit 1

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

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

Unit 2

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

Unit 3

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

Unit 4

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

Unit 5

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

Text Book(s)

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

Reference Material(s)

• Morris, Network management, Pearson Education.
• Mark Burges, Principles of Network System Administration, Wiley Dreamtech Publication.
• Paul, Distributed Network Management, John Wiley Publication.
• Andrew S. Tanenbaum, Computer Networks, Addison-Wes

SYLLABUS

MTech (NM)

1st SEMESTER

Session 2021-2022

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.

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Course Name MTech (NM) 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-Wes

Course Name MTech (NM) 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

MTech (NM) 1st SEM Session 2021-2022

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 Serve

Course Name MTech (NM) 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. Understand information security's importance in our increasingly computer-driven world.
2. Master the key concepts of information security and how they "work."
3. Develop a "security mindset:" learn how to critically analyze situations of computer and network usage from a security perspective, identifying the salient issues, viewpoints, and trade-offs.

Learning Outcomes

1. Explain the challenges and scope of information security;
2. Explain such basic security concepts as confidentiality, integrity, and availability, which are used frequently in the field of information security;
3. Explain the importance of cryptographic algorithms used in information security in the context of the overall information technology (IT) industry;
4. Identify and explain symmetric algorithms for encryption-based security of information;
5. Identify and explain public-key based asymmetric algorithms for encryption-based security of information;
6. Describe the access control mechanism used for user authentication and authorization;

Unit 1

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

Unit 2

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

Unit 3

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

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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)

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

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.
4. Atul Kahate; “Cryp

Course Name MTech (NM) 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 different routing techniques.

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.

SYLLABUS

MTech (NM)

2nd SEMESTER

Session 2021-2022

Mission of SCS&IT, DAVV

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

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

Aim of the Subject

The 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
Learning, USA, 2020, Third Edition.

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) 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, ISBN-13: 978-01323907744.

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) 2nd Semester
Subject Code: CS-6623
Subject Name: Mobile & 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 communications systems, RF vs. IR, Mobile applications, Limitations.
Mobile Radio Propagation: Introduction, Propagation mechanism, Path loss, Slow

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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.

Course Name MTech (NM) 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

2. To focus on several areas of wireless and mobile technologies including;Wireless LAN, Cellular Network, Ad-hoc Network and Satellite Communication.

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 (NM) 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

3. To explain architecture and infrastructure for wireless and mobile systems.

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