MVN UNIVERSITY

Department of Computer Science and Engineering

Master of Technology (Full time)

Scheme and Syllabus
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Objective
This course discusses about software engineering principles using object-oriented (OO) software development methodologies. Unified Modeling Language (UML), which was put together in response for proposals initiated by the OMG (Object Management Group), in order to define a standard notation for modeling object-oriented applications.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION – A

Unit 1: Introduction

Unit 2: Requirement Engineering
Requirement Elicitation: Introduction to Object Oriented Methodology, Overview of Requirements Elicitation, Requirements Model-Action & Use cases, Requirements Elicitation Activities, Managing Requirements Elicitation.

Unit 3: Modeling with UML
Basic Building Blocks of UML, A Conceptual Model of UML, Basic Structural Modeling, UML Diagrams.

SECTION – B

Unit 4: Architecture
Introduction, System development is model building, model architecture, requirements model, analysis model, the design model, the implementation model, test model.

Unit 5: Analysis and Construction
Introduction to analysis, the requirements model, the analysis model. Introduction to construction, the design model, block design, working with construction.

Unit 6: Testing
Introduction on testing, unit testing, integration testing, system testing, the testing process.
Text Books


Reference Books

1- K.K. Aggarwal-“Software Engineering”

# Software Engineering Concepts & Methodology

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## Objective
This subject lets you know how computer software is developed using an engineering approach.

## Theory

**Note:** Total five questions are to be attempted from Sections A & B.

### SECTION – A

#### Unit 1: Introduction


#### Unit 2: Requirement Engineering

Requirement elicitation techniques like FAST, QFD & Use case approach, requirements analysis and negotiations, Information modeling - Data flow diagrams - Entity Relationship, Requirement Specification & Documentation.

#### Unit 3: Planning and Estimation


### SECTION - B

#### Unit 4: Metrics and Measurement


#### Unit 5: Advance Testing Techniques

Introduction to Software Testing, Testing terminology and Methodology, Verification and validation, Black Box testing, White Box testing, Static testing, Validation Testing, Test
Automation and debugging.

**Unit 6: Maintenance**


**Text Books**

2- K.K. Aggarwal-“Software Engineering”

**Reference Books**

MVN University, Haryana

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**Objective**

Today is the era of distributed computing. This subject focuses on distributed architecture and problems.

**Theory**

**Note:** Total five questions are to be attempted from Sections A & B.

**SECTION – A**

**Unit 1: Introduction to Distributed Systems**


**Unit 2: Foundation and Goals of Distributed System**

Limitation of Distributed system, Logical clocks, Causal ordering of messages, Goals Of Distributed System, Client – Server Model, Shared memory, Hardware and Software concepts, Global state.

**Unit 3: Distributed Objects and Remote Invocation**

Communication between distributed objects, Remote procedure call, Events and notifications, Security: Overview of security techniques, Cryptographic and Digital signatures pragmatics.

**SECTION – B**

**Unit 4: Transactions and Concurrency Control**

Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols.

**Unit 5: Distributed System Processes**

System Model, Threads, Process Allocation, Scheduling in Distributed System, Real Time Distributed System.

**Unit 6: Synchronization and Deadlock in Distributed System**
System model, Clock synchronization, Distributed deadlock prevention, Distributed deadlock avoidance, Distributed deadlock detection & resolution, File system introduction, Case study.

**Text Books**

1- Distributed Operating System – Andrew S. Tanenbaum, PHI

**Reference Books**

2- Operating System Concepts , P.S.Gill, Firewall Media
**Objective**
This subject is covering the advance knowledge of programming in foundation languages like C and C++.

**Theory**

*Note:* Total five questions are to be attempted from Sections A & B.

### SECTION – A

**Unit 1: Introduction to Programming**
All basic programming introduction (loops, function, array, structure and union), Pointers and addresses, pointers and function arguments, pointer and arrays, address arithmetic, character pointers and functions, initialization of pointer arrays, pointers and multidimensional arrays, command line arguments.

**Unit 2: Memory Handling**
Memory management, Structures: Defining and processing, passing to a function, Unions.

**Unit 3: File Handling**
Defining and opening file, closing file, I/O operation on files, error handling during I/O operations, Random Access to files and command line arguments.

### SECTION – B

**Unit 4: Basic terms and ideas**
Abstraction, Encapsulation, Inheritance, Polymorphism, Encapsulation, information hiding, C++ class declaration, constructors and destructors, default parameter value

**Unit 5: Use of Base and Derive class**
Inheritance, Class hierarchy, derivation – public, private & protected; aggregation, polymorphism, operator overloading, function name overloading, Overriding inheritance methods, Run time polymorphism, Multiple Inheritance.

**Unit 6: File Handling and Template Library**
Persistent objects, Streams and files, Namespaces, Exception handling, Generic Classes, Generic Functions. Files & Streams, Stream Manipulators.

**Text books**
Reference Books
Objective

MATLAB is a software package for carrying out numerical computations and analyses. It uses blocks of data called matrices (MATLAB stands for matrix laboratory). MATLAB is the most commonly used scientific and engineering numerical software. The lab enables the student to program in Mat lab.

1- Introduction to MATLAB with its brief description of starting programming environment.
2- Write all commands to perform simple arithmetic, logarithmic, Exponential, Trigonometry and Complex number Operations.
3- Write commands to perform various operations on vector and matrix.
4- Write commands to perform various operations on vector and matrix using built in functions and indexing.
5- Write a script file to perform various operations using conditional statements.
6- Write a script file to perform various operations using flow of control loops and conditional statements.
7- Write a function file to perform various operations using flow of control loops.
8- Write a function file to perform various operations using flow of conditional statements.
9- Write a program to plot expressions.
10- Write a program to plot functions.
11- Write a program for writing and reading from a file.
Each candidate is required to give one seminar on any chosen topic connected with the field of specialisation. The topic shall be chosen in consultation with the concerned Faculty and Head of the Department. Preparation and presentation of a seminar is intended to investigate an in-depth review of literature; to prepare a critical review and to develop confidence for making a good presentation. A report has to be submitted in the prescribed format and the seminar shall be evaluated by the respective department committee.
Objective
Today is the era of parallel processing in Computer. This subject focuses on the Computer Architecture, pipelined and parallel processor design and algorithms used.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION – A

Unit 1: Introduction to Parallel Processing
Memory and Input-Output Subsystems: Hierarchical Memory Structure, Virtual Memory System, Memory Allocation and Management, Cache Memories and Management, Input-Output Subsystems.

Unit 2: Principles of Pipelining And Vector Processing
Pipelining, Instruction And Arithmetic Pipelines, Principles Of Designing Pipelined Processors, Vector Processing Requirements.

Unit 3: Pipeline Computers and Vectorization Methods
The Space of Pipelined Computers, Architecture of Star-100, the instruction format of Star-100, Scientific attached processor: the architecture and instruction format of AP-120B, the recent vector processors: the architecture of Cray-1, pipeline chaining and vector loop, Vectorization and Optimization Methods: parallel language for vector processing, design of a vectorizing compiler, optimization of vector functions.

SECTION – B

Unit 4: Structures and Algorithms for Array Processors:
SIMD Array Processors, SIMD Interconnection Networks: static versus dynamic networks, mesh-connected illiac network, cube interconnection network, Parallel Algorithms for Array Processors: SIMD matrix multiplication, parallel sorting on array processors, Associative Array Processing: associative memory organization, study of STARAN.
SIMD Computers: The Space of SIMD Computers, the study of Illiac-IV system architecture.
Unit 5: Multiprocessor Architecture And Programming:

Functional Structures: loosely coupled and tightly coupled multiprocessors, processor characteristics for multiprocessing, Interconnection Networks: time shared or common bus, crossbar switch and multiport memories, Parallel Memory Organization: interleaved memory configurations, multicache problems and solutions, Exploiting Concurrency for Multiprocessing.

Unit 6: Multiprocessing Control And Algorithms


Text Books

1. Pipelined and Parallel Processor Design By Michael J. Fuyy – 1995, Na

Reference Books

1. Advanced Computer Architecture: Parallelism, Scalability, And Programmability By Kai Hwang. Publisher: Mcgraw Hill
2. Computer Architecture and Parallel Processing By Hwang & Briggs, TMH.
Objective
This course of Advance Operating system provides knowledge about distributed computing and algorithms, deadlocks, failures and recovery, and protection.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION – A

Unit 1: Introduction

Functions of operating system, Design approaches, why resource planning, types of advanced operating system

Unit 2: Synchronization mechanisms


Unit 3: Process Deadlock

Preliminaries, models of deadlock, models of resources, and operations on general resource graph. Necessary and sufficient condition for a deadlock: Graph reduction Method, system with only consumable, Systems with only reusable resources: deadlock detection, deadlock prevention, deadlock avoidance: Banker’s Algorithm.

SECTION – B

Unit 4: Distributed operating system

Architectures of distributed systems, distributed mutual exclusion: Introduction, classification of mutual exclusion algorithms: Non-Token-Based Algorithm (Lamport’s Algorithm), Token-based Algorithm (Suzuki-Kasami’s Broadcast Algorithm), agreement protocols: The System Model, classification of agreement problems, solution to the Byzantine Agreement problem, applications of agreement algorithms.
Unit 5: Failure Recovery

Classification of failures, backward and forward error recovery, consistent set of check points, synchronous and asynchronous check point and recovery.
Fault tolerance: atomic actions and committing, commit protocol, non-blocking commit protocol, voting and dynamic voting protocol, dynamic vote reassignment protocol.

Unit 6: Protection and security

Access and flow control: the access matrix model, advanced models of protection, cryptography: conventional and modern cryptography, the Kerberos system.

Text Books


Reference Books

1. Distributed Operating System – Andrew S. Tanenbaum, PHI
2. Operating System Concepts, P.S.Gill, Firewall Media
Objective
This course of Advance JAVA provides knowledge about JDBC, Servlets, Java server pages, Beans, Frameworks, and J2EE technologies.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION – A

Unit 1: Core java

Introduction to Java, Data types, variables, operators, Arrays, Control Statements, Classes & Methods, Inheritance, Exception Handling, Multithreading, Collections, I/O streams, AVVT & Apolet Programming.

Unit 2: Advance JDBC Programming

Overview of Database Driver Architecture, Introduction to JDBC Standard Extension API (javax.sql), Connection Pooling, JDBC Programming with ORACLE etc., Batch Processing, Connecting to non-conventional databases, Use of Excel API, Handling SQL escape syntax, Calling SQL functions, Database stored procedures, Dealing with Database Metadata, Handling Binary Data (Operation on Image File).

Unit 3: Introduction to J2EE: Servlet


SECTION – B

Unit 4: Java Server Pages Technology

Basic JSP Architecture, Life Cycle of JSP (Translation, compilation), JSP Tags and Expressions, Role of JSP in MVC, JSP with Database, JSP Implicit Objects, Tag Libraries, JSP Expression Language (EL), Using Custom Tag, JSP Capabilities: Exception Handling, Session Management, Directives, JSP with Java Bean.

Unit 5: RMI

Unit 6: Other J2EE Technologies

Java Mail, JPA, Web Services, Hibernate, Spring Framework

Text Books

1. Professional Java server programming, “Subrahmanyam allamaraju and cedric Buest”

Reference Books

1. Struts 2 in Action by Donald Brown, Davis,Stanlick.
2. Struts 2 Design and Programming: A Tutorial by Budi Kurniawan
3. Core servlets and Java Server Pages: Volume 2, Advanced Technology by Marry Hall, Larry Brown, ChaiKin
5. Head First JSP, Head First Servlet, Head First EJB, ketthy siera orally.
Objective
This subject focuses to have an understanding of grammars, knowledge of Turing machine and decidable and undecidable problems, understanding of natural language processing, provide a general introduction including the use of state automata for language processing, provide the fundamentals of syntax including a basic parse, explain advanced feature like feature structures and realistic parsing methodologies.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION – A

Unit 1: Grammar

Introduction to grammar, Chomsky hierarchies of grammars, Derivations and Languages, derivation trees, ambiguity, simplification of CFG, Greiback Normal form, Chomsky normal forms, Problems related to CNF and GNF.

Unit 2: Turing Machines


Unit 3: Undecidability

Properties of recursive and Recursively enumerable languages, RAM model, Primitive and partial recursive functions, Logic - completeness and incompleteness, Decidability and Church-Turing hypothesis

SECTION – B

Unit 4: Introduction

Unit 5: Syntax


Unit 6: Semantic


Text Books


Reference Books

Objective
This laboratory of Oracle provides knowledge about data creation, editing, maintenance, and various other operations.

Practicals are based on following

1. Basic SQL SELECT statements
2. SQL * PLUS overview
3. Single – Row functions
4. Aggregating data and group functions
5. Joins and sub-queries
6. Modifying data
7. Managing tables and constants
8. Managing views
9. Other data base objects
10. User access and security
11. PL/SQL Basics
12. PL/SQL data handling
13. PL/SQL optimization techniques
14. Triggers
15. PL/SQL DBA packages
16. PL/SQL security packages
17. PL/SQL web packages
18. PL/SQL debugging

Text books
1. OCA/OCP : Introduction to SQL 9i SQL study guide by Chip Dawes and Biju Thomas, Pub. SYBEX
Reference Books

A technical / research problem to be handled by the candidate and submit a report.
Objective
This subject let you know about the neural networks & fuzzy logics, operations on fuzzy sets & fuzzy arithmetic.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION-A

Unit-1: Neural Networks

Unit-2: Fuzzy Logic

Unit-3: Operations on Fuzzy Sets
Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Section-B

Unit-4: Fuzzy Arithmetic

Unit-5: Fuzzy Logic

Unit-6: Uncertainty based Information

Text Books
Reference Books

1. “Introduction to Fuzzy sets and Fuzzy Logic”, M. Ganesh, PHI
Objective
This subject let you know, how search engines & its components used to retrieve information from WWW.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION - A

Unit 1: Introduction to Information Retrieval

Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination scheme.

Unit 2: Index construction

Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, dynamic indexing, other types of indexes

Index compression: Statistical properties of terms in information retrieval, Heaps’ law: Estimating the number of terms, Zipf’s law: Modeling the distribution of terms, Dictionary compression, Dictionary as a string, Blocked storage, Postings file compression.

Unit 3: Scoring, term weighting and the vector space model

Parametric and zone indexes, Weighted zone scoring, Learning weights, The optimal weight, Term frequency and weighting, Inverse document frequency, Tf-idf weighting, The vector space model for scoring, Variant tf-idf functions.

SECTION – B

Unit 4: Computing scores in a complete search system

Efficient scoring and ranking, Inexact top K document retrieval, Index elimination, Champion lists, Static quality scores and ordering, Impact ordering, Cluster pruning, Components of an information retrieval system, Tiered indexes

Unit 5: Web search basics

Background and history, Web characteristics, The web graph, Spam, Advertising as the economic model, The search user experience, User query needs Crawling, Crawler architecture, DNS resolution, The URL
MVN University, Haryana


**Unit 6: Language Models for Information Retrieval**

Language models, Finite automata and language models, Types of language models, Multinomial distributions over words, The query likelihood model, Using query likelihood language models in IR, Estimating the query generation probability, Language modeling versus other approaches in IR.

**Text books**

1. Introduction to Information Retrieval by Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze published in Cambridge University Press Cambridge, England
Objective
This subject let you know about the concepts of advance topics in software engineering.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION-A

Unit 1


Requirements Analysis and specification requirements engineering, system modeling and simulation, prototyping: Prototyping methods and tools; Specification principles, the software requirements specification(SRS IEEE Format),Modeling: Data Modeling, Functional modeling and information flow(DFDs), Behavioral Modeling; The mechanics of structured analysis: Creating entity/relationship diagram, control flow model, The data dictionary; Other classical analysis methods.

Unit 2

System Design: Design concepts and principles: the design process: Design and software quality, design principles; Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, software procedure, information hiding; Effective modular design: Functional independence, Cohesion, Coupling; The design model.

Unit 3

Architectural Design: Software architecture, Data Design: Data modeling, data structures, databases and the data warehouse, Analyzing alternative Architectural Designs, architectural complexity; Mapping requirements into a software architecture; Transform flow, Transaction flow; Transform mapping: Refining the architectural design.

SECTION - B

Unit 4

Project Management Concepts
People, Product, Process, Project, Problems with software projects, project management and CMM,

Software Project Planning
Management and project evaluation, Project planning objectives, effort estimation models, estimation techniques: Function Point Analysis, COCOMO, Use case point analysis.

Activity planning: project schedules, projects and activities, network planning models, activity on node & activity on arrow networks.
Unit 5

**Risk Management:** identification, assessment and projection, control, RMMM plan, Measurement and tracking planning, Configuration management: baselines, configuration items, configuration process, configuration audit, SCM standards

**Project Execution and Closure**
Project reporting structures, collecting the data: risk reporting. Visualizing progress: Gantt chart, Slip chart, Ball charts, Timeline charts. Earned value analysis,

**Software Quality Assurance**
Project management vs quality management, quality concepts, quality metrics, BS 6079:1996 standard

Unit 6

**Testing and maintenance:** Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, white box testing, basis path testing: Control structure (cyclomatic complexity) testing, graph matrices, Black box testing. Software Testing Strategies: Verification and validation, Unit testing, Integration testing, Validation testing, alpha and beta testing; System testing: Recovery testing, security testing, stress testing, performance testing; The art of debugging, the debugging process debugging approaches. Software re-engineering, reverse engineering, restructuring, forward engineering.

**Text Books**

1. Software Project Management Bob Hughes, Mike Cotterell
2. K.K. Aggarwal—“Software Engineering”

**Reference Books**

Objective
This subject let you know about the data warehouse and data mining, rules for data mining and recent trends & Web mining.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION-A

Unit-1: Introduction to Data Warehouse

Data warehousing Definition, DBMS vs data warehouse, Three-tier architecture, Multidimensional data model, Schemas for Multidimensional Databases, OLAP operations, multi-feature cubes.

Unit-2: Introduction to Data Mining

Data mining definition & task, KDD process, KDD versus data mining, data mining tools and applications, issues, data mining task primitives, supervised and unsupervised learning approaches, Data preprocessing.

Unit-3: Mining Association rules

The a-priori algorithm, generating rules, improving the efficiency of a-priori; rule mining by partitioning; Parallel and Distributed algorithms: CDA & DDA; advanced techniques: multi-dimensional and multi-level association rules, correlation rules; meta-rule guided mining and constraint based rule mining, Incremental rule mining.

Section-B

Unit 4: Clustering techniques

Cluster analysis, similarity and distance measures, partitioning methods: squared error, k-means, k-medoids and genetic algorithm approach; Hierarchical Clustering: agglomerative Vs Divisive, Density based methods: Basic definitions and DBSCAN algorithm; Constraint based clustering.

Unit 5: Classification and Prediction

Classification by Decision tree induction: information gain measure, Tree pruning methods, Bayesian classification, rule based classification, backpropagation through Neural Networks, Genetic Algorithm, Rough Sets, Support Vector Machines and Fuzzy techniques; Prediction: linear and non-linear regression techniques.
Unit 6: Recent trends and Web Mining

Mining of Complex Data Objects, Spatial Databases, Temporal Databases; Web Mining, categories of web mining: web structure mining, web content mining and web usage mining, kinds of knowledge discovered in web mining.

Text Books

1. Data Mining: Introductory and advanced topics: Margaret H Dunham, S. Sridhar; Pearson education, 2008.

Reference Books

1. Data Warehousing In the Real World; Sam Anahory & Dennis Murray; 1997, Pearson.
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Objective
The purpose of the course is to provide the student with an overview of the field of Information Security and Assurance. Students will be exposed to the spectrum of Security activities, methods, methodologies, and procedures. Coverage will include inspection and protection of information assets, detection of and reaction to threats to information assets.

Theory
Note: Total five questions are to be attempted from Sections A & B.

Section A

Unit-1: Basic concepts of security and cryptography: security-Confidentiality, integrity, availability, Security policies, security mechanisms, assurance. Cryptography- Historical background Transposition/Substitution, Caesar Cipher. Introduction to Symmetric crypto primitives, Asymmetric crypto primitives, and Hash functions.

Unit-2: Secret key cryptography: Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA), Encrypting large messages (ECB, CBC, OFB, CFB, CTR), Multiple Encryption DES (EDE), Advanced Encryption Standard (AES), Message Digest.

Unit-3: Public Key Cryptography: The RSA algorithm, Symmetric and Asymmetric Key Cryptography Together. Digital Signatures, Knapsack Algorithm; Public Key Infrastructure (PKI) Digital Certificates, Private Key Management, The PKI Model, Public Key Cryptography Standards (PKCS);

Section B

Unit 4: Internet Security Protocols: Secure Socket Layer (SSL), Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), SSL versus SET, 3-D Secure Protocol,


Text Book

Reference books
1- Charlie Kaufman, Radia Perlman, Mike Speciner "Network Securities" Pearson,
2- J. A. Cooper "Computer Communication Securities" TMH,
3- D.W. Davies W. L. Price "securities For computer Networks"
Objective
Today is the era of Computer. This subject focuses on the advanced algorithm design techniques and the analysis of new emerging techniques in computer science and engineering.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION – A

Unit 1: Introduction to Algorithm

Definition and characteristics of an algorithm, Overview of basic data structures: Array, Stack, Queues, Trees, and Graphs, algorithm specification: Pseudo conventions, Concept of recursion, recursive version of Towers of Hanoi, Performance analysis: space and time complexities, asymptotic notations. Sets and disjoint set union.

Unit 2: Divide and Conquer Techniques

Recurrences: the recursion tree method and master method, binary search, quick sort, merge sort, strassen’s matrix multiplication, and convex hull.

Unit 3: Greedy Techniques

The general method, knapsack problem, job sequencing with deadline, Huffman codes, minimum cost spanning tree: Prim’s, Kruskal’s, Single-source shortest path: the Bellman-ford algorithm, Dijkstra’s algorithm, All-pair shortest path: the Floyd-Warshall algorithm.

SECTION – B

Unit 4: Dynamic Programming

The General method, 0/1 knapsack problem, matrix-chain multiplication, travelling salesman problem, longest common subsequence, optimal binary search tree.

Unit 5: Backtracking and branch-and-bound Techniques

Backtracking: the general method, the 8-queen problem, graph colouring problem, Hamiltonian cycles problems, knapsack problem.
Branch-and-bound: the general method, 0/1 knapsack, travelling salesman.
Unit 6: Miscellaneous Algorithms

B-Trees, NP-Completeness: Definition of P, NP, and NP-complete, polynomial-time verification of Hamiltonian cycles, NP-completeness and reducibility: circuit-satisfiability, formula satisfiability, some NP-complete problems: The clique problem, the vertex cover problem, the Hamiltonian cycle problem.

Text Books
1- Fundamentals of computer algorithms by Ellis Horowitz, Sartaj Sahni, Galgotia Pub.

Reference Books
1- Jon Kleinberg and Eva Tardos, algorithm design, Pearson, 2005.
5- The Algorithm Design Manual by Steven S. Skiena. Springer.
6- The Design and Analysis of Algorithms by Dexter C. Kozen, D. C. Kozen, David Gries. Springer.

LAB:

Note: At least ten experiments are to be performed during the semester. At least eight experiments should be performed from the list of experiments. Two experiments may either be performed from the given list of experiments or may be designed by the concern faculty in consultation with H.O.D as per the scope of syllabus.

Objective: To understand the concepts of advanced data structures and how several algorithms work for solving problems that arise frequently in computer applications.

List of Experiments:

Note: C/C++ can be used to implement the following programs.

1- Implementation of stack using array.
2- Perform various operations on queue.
3- Perform merge sorting operation and measure the execution time for sufficient large input.
4- Implementations of quick sort algorithm using divide and conquer technique.
5- To write a program to perform binary search using the divide and conquer technique.
6- Solve job sequencing problem using Greedy Strategy.
7- Find Minimum Cost Spanning Tree of a given undirected graph using Prim’s algorithm.
8- Implementation of minimum cost spanning tree with the help of Kruskal’s algorithm.
9- Perform Single source shortest path using the Bellman-ford algorithm.
10- Implement Travelling Salesperson Problem Travelling Salesman Problem Using Dynamic Programming.
11- Implement longest common subsequence problem.
12- Solve 8-queen and 4-queen problems using Backtracking.
13- Perform graph coloring problem, using backtracking.
In this paper, the students will be doing analysis/implementation of a research problem to be assigned by internal/external guide with consent of the Head of the department. The student is expected to carry out detailed literature survey of the research problem. At the end of the semester the student will submit a report of the work carried out. A student is required to continue and finalized his/her research work in the last semester of the course and required to submit the final Dissertation report.
Each candidate is required to give one seminar on any chosen topic connected with the field of specialisation. The topic shall be chosen in consultation with the concerned Faculty and Head of the Department. Preparation and presentation of a seminar is intended to investigate an in-depth review of literature; to prepare a critical review and to develop confidence for making a good presentation. A report has to be submitted in the prescribed format and the seminar shall be evaluated by the respective department committee.
Objective
This subject let you know about the neural networks & fuzzy logics, operations on fuzzy sets & fuzzy arithmetic.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION-A

Unit-1:
Fault Diagnosis of Air-conditioning system using CMAC neural network approach, Prototypes stability analysis in the design of radial basis function neural networks, Canadian weather analysis using connectionist learning paradigms.

Unit-2:

Unit-3:
Visual inspection of fuzzy clustering results, Benchmark between three controllers in IFOC: PI, IP and new fuzzy-PI regulator.

SECTION-B

Unit-4:
Determining the model order of nonlinear input-output systems by fuzzy clustering, fuzzy self-organizing map based on regularized fuzzy c-means clustering.

Unit-5:
Outline representation of fonts using genetic approach, process oriented plant layout design using a fuzzy set decomposition algorithm.

Unit-6:
A fuzzy colour image segmentation applied to robot vision, applying rule weight derivation to obtain cooperative rules, XML based modeling of soft computing methods.
Text Books


Reference Books

1- “Introduction to Fuzzy sets and Fuzzy Logic”, M. Ganesh, PHI.
5- “Fuzzy sets and Fuzzy Logic: Theory and applications”, G.J. Klir, B. Yuan, PHI.
**Objective**
This subject lets you know how search engines & its components are used to retrieve information from WWW.

**Theory**

**Note:** Total five questions are to be attempted from Sections A & B.

### SECTION - A

**Unit 1:**

**Unit 2:**

**Unit 3:**

### SECTION – B

**Unit 4:**

**Unit 5:**

**Unit 6:**
MVN University, Haryana

The Role of Natural Language Processing in Information Retrieval (Searching for Meaning and Structure): Introduction, Natural Language Processing Techniques, Applications of Natural Language Processing in Information Retrieval.

Text Books

1- Information Retrieval: Searching in the 21st Century by Ayse Goker (Editor), John Davies (Co-Editor).


Reference Books


LAB:

Note: At least ten experiments are to be performed during the semester. At least eight experiments should be performed from the list of experiments. Two experiments may either be performed from the given list of experiments or may be designed by the concern faculty in consultation with H.O.D as per the scope of syllabus.

Objective: To understand the concepts of advanced techniques of information retrieval.

List of Experiments:

1- WAP to perform indexing of a url and store the indexed data in database

2- WAP to perform sorting in the indexed data in code of a url.

3- WAP to remove stop words from the tokens of the source code of a url.

4- WAP to perform stemming of the tokens of the source code of a url.

5- WAP to remove Html Tags from the source code of a url.

6- WAP to get title of the source code from a url

7- WAP to get meta tag desc of the source code from a url

8- WAP to perform indexing of a url and store the indexed data in database.

9- WAP to perform searching in the indexed data in database.

10- WAP to perform searching in the indexed data in database.

11- WAP to implement the following algorithm

Algorithm for Crawling

1- Crawler visits all web pages of website for first time.
2- It uses Robot.txt for reference.
3- Crawler checks the updates and compares with its own last visit.
4- If updates in file are new for crawler, crawler visits the updated pages and download pages for indexing.
5- Crawler splits the keywords of each webpage.
6- For all separated keywords, Crawler takes the first alphabet of keyword.
7- Crawler Initialize first alphabet of keyword as root of the keyword.
8- Crawler Stores the keywords in database with their roots.
Objective
This subject let you know about the concepts of advance topics in software engineering.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION-A


Unit 3: Software Development Methodologies: Iterative Software Development, Software Reuse, CBSE(component bases software engineering): Definition and characteristics of components, History, Differences from object-oriented programming, Architecture, examples of CBSE models, Critical Systems Development

SECTION - B


Text Book:
Reference Book:

1. Software Design, 2\textsuperscript{nd} Edition by David Budgen, Pearson

4. K.K. Aggarwal-“Software Engineering”.

MVN University, Haryana
Objective
This subject let you know about the data warehouse and data mining, rules for data mining and recent trends & Web mining.

Theory
Note: Total five questions are to be attempted from Sections A & B.

SECTION-A

Unit-1: Introduction to Data Warehouse: Data warehousing Definition, DBMS vs data warehouse, Three-tier architecture, Multidimensional data model, Schemas for Multidimensional Databases, types of OLAP servers: ROLAP, MOLAP, HOLAP OLAP operations.

Unit-2: Introduction to Data Mining: Data mining definition & task, KDD process, KDD versus data mining, data mining tools and applications, issues, data mining task primitives, supervised and unsupervised learning approaches.

Unit-3: Mining Association rules: The A-priori algorithm, generating rules, improving the efficiency of a-priori; rule mining by partitioning; Parallel and Distributed algorithms: CDA & DDA; advanced techniques: multi-dimensional and multi-level association rules, correlation rules; meta-rule guided mining and constraint based rule mining, Incremental rule mining.

SECTION-B

Unit 4: Clustering techniques: Cluster analysis, similarity and distance measures, partitioning methods: squared error, k-means, k-medoids, Hierarchical Clustering: agglomerative Vs Divisive, Density based methods: Basic definitions and DBSCAN algorithm; Constraint based clustering.

Unit 5: Classification and Prediction: Classification by Decision tree induction: information gain measure, Tree pruning methods, back propagation through Neural Networks, Genetic Algorithm, Rough Sets, Support Vector Machines and Fuzzy techniques; Prediction: linear and non-linear regression techniques.

Unit 6: Recent trends and Web Mining: Mining of Complex Data Objects, Spatial Databases, Temporal Databases; Web Mining, categories of web mining: web structure mining, web content mining and web usage mining, kinds of knowledge discovered in web mining.

Text Books
1- Data Mining- Concepts & Techniques; Jiawei Han & Micheline Kamber- 2001, Morgan Kaufmann.

Reference books
1- Data Mining: Introductory and advanced topics: Margaret H Dunham, S. Sridhar; Pearson education, 2008.
2- Data Warehousing In the Real World; Sam Anahory & Dennis Murray; 1997, Pearson.
3- Data Mining Techniques; Arun Pujari; 2001, University Press; Hyderabad.
4- Data Mining; Pieter Adriaans & Dolf Zantinge; 1997, Pearson,
5- Data Warehousing, Data Mining and OLTP; Alex Berson, 1997, McGraw Hill.
In this paper, the students are required to complete and submit final dissertation report which will be evaluated by the departmental committee.