MVN UNIVERSITY

Department of Computer Science and Engineering

Master of Technology (Full time)

New Scheme and Syllabus
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<th>Paper code</th>
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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”
## CSL503-A 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**

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. Fijnn – 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 Advanced 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, “Subrahmanyan 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 Mary Hall, Larry Brown, ChaiKin
5. Head First JSP, Head First Servlet, Head First EJB, ketthy siera orally.
MVN University, Haryana

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

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.