Approved by the Vice-Chencellor

Dated: 21/01/2025

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM-533296

AKNU COLLEGE OF ENGINEERING

MASTER OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year Course

w.e.f.

(2024-2026)

Admitted Batch onwards

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RAJAHMUNDRY-533 296.

M.Tech I-Year I-Sem

SYLLABUS

- Name of the Program: M.Tech - Computer Science and Engineering.
- Eligibility for Admissions: B.E CSE/IT or B.Tech CSE/IT, any branch of related to Computer Science and Engineering AMIE+Diploma in CSE/IT.

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Course Structure

Semester	Courses	Level of Course	Theory/Practical		
			Hr	Cr	*MM*
Semester 1	Mathematical Foundations of Computer Science	500 -599	4	4	100
	Distributed Operating Systems	500 -599	4	4	100
	Advanced-Data Structures	500 -599	3	3	100
	Object Oriented Software Engineering	400 -499	3	3	100
	Data Mining Concepts and Applications	400 -499	3	3	100
	Advanced-Data Structures Lab	500 -599	3	2	100
	OOSE LAB	400 -499	3	2	100
	Data Mining Concepts Applications Lab	400 -499	3	2	100
Total Hours/Credits End of Semester I			**26**	**23**	

Semester	Courses	Level of Course	Theory/Practical		
			Hr	Cr	*MM*
Semester 2	Core Paper I	500 -599	4	4	100
	Core Paper II	500 -599	4	4	100
	Core Paper III	500 -599	3	3	100
	Skill Paper I	400 -499	3	3	100
	Skill Paper II	400 -499	3	3	100
	Lab 1	500 -599	3	2	100
	Lab 2	400 -499	3	2	100
	Lab 3	400 -499	3	2	100
Total Hours/Credits End of Semester II			**26**	**23**	

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Semester	Courses	Level of Course	Theory/Practical		
			Hr	Cr	MM
Semester 3	Core Paper I	500 -599	4	4	100
	Core Paper II	500 -599	4	4	100
	Elective I	500 -599	3	3	100
	Elective II	400 -499	3	3	100
	Lab 1	400 -499	3	2	100
	Lab 2	400 -499	3	2	100
	Mini Project	400 -499	3	2	100
Total Hours/Credits End of Semester III			**23**	**20**	

Semester IV	Courses	Level of Course	Theory/Practical		
			Hr	Cr	MM
	MOOCs	400 -499		2	
	Project	500 -599	3	12	400
Total Hours/Credits End of Semester IV			**3**	**12**	

Project Evaluation : 200 Marks Internal and 200 Marks External Examination

TOTAL SEMESTERS	TOTAL CREDITS
Semester I	23
Semester II	23
Semester III	20
Semester IV	14
Total	80

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REGULATIONS FOR M.TECH ADMITTED BATCH

1. The following method of assessment shall be followed for M.Tech CSE offered by the University. The maximum marks for all theory and Practical courses shall be 100. The distribution of marks between Summative (which occur at the end of a course or semester) and Formative or internal assessments shall be 60%: 40%.

2. There will not be any pass minimum for formative/internal assessment either in a theory course or in a practical course; however, the student has to appear for at least one mid semester examination.

3. The pass minimum for the summative assessment shall be 40% (i.e., 24 out of 60 in External and 40 out of 100 in Summative) in theory courses and 50% (25 marks out of 50 in External and 50 marks out of 100 in Summative) in practical courses and project works.

4. (a) The following model be adopted for Formative/Internal Assessment in theory courses:

   (i) Mid Semester Examinations – 30 Marks.

   Two Mid Semester Examinations shall be administered and the average score from both these examinations contributing a total of 30 Marks.

   (ii) Five Marks for Attendance in the following manner.

   75%-80% - 1mark
   81%-85% - 2marks
   86%-90% - 3marks
   91%-95% - 4marks
   96%-100% - 5marks

   (iii) Five Marks for Quiz/Assignments

   (iv) Five Marks for Student Seminar/participation in national or international seminars/ Creative Portfolio.

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(b) The following model be adopted for Formative/Internal Assessment in practical courses

(i) Internal practical examinations are to be conducted after the completion of instructions and before the commencement of semester end theory examinations for 20 marks (i.e., 40% of 50).

5. The teaching hours per week for each theory course for science programs shall be (3+1*) hours and (4+1*) hours for non-science programs with 3 and 4 credits respectively. The work load per week for each practical/field course shall be 2 hours with 1 credit.

6. Research methodology courses may be offered through online mode by the teachers of the University or the students may be encouraged to complete them through SWAYAM or MOOCS platforms. The same may be offered through physical/class room teaching. Appropriate decision in this regard may be taken by the respective BOS in consultation with the faculty members of their concerned departments.

7. A list of online courses may be prepared in the respective BOS meeting for all open online trans disciplinary and open online skill development courses, giving a choice to the students to choose one/two courses from that list and to complete to earn required credits.

8. Award of Grades: For all Post Graduate Programs in Arts, Commerce and Sciences.

Range of Marks	Grade	Grade Points	
$\geq 90 \leq 100$	O	10	Out Standing
$\geq 80 < 90$	A+	9	Excellent
$\geq 70 < 80$	A	8	Very Good
$\geq 60 < 70$	B+	7	Good
$\geq 55 < 60$	B	6	Above Average
$\geq 50 < 55$	C	5	Average
$\geq 40 < 50$	P	4	Pass
< 40	F	0	Fail
	NA		Absent

Note: A candidate will be declared to be passed with distinction only if he/she gets a grade A and above, provided if he/she passes all the courses in a regular mode and in a single attempt every semester.

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1. Calculation of SGPA (Semester Grade Point Average)

$$SGPA = \frac{Sum \text{ of products of grade points and credits of all the concerned subjects}}{\text{Sum of credits of all the subjects in the semester}}$$

$$= \frac{\sum_{1}^{n}(Grade\ Point * Credits)}{\sum_{1}^{N} Credits}$$

Where 'n' is the total number of subjects

2. Calculator of CGPA (Cumulative Grade Point Average)

$$CGPA = \frac{Sum\ of\ products\ of\ grade\ points\ and\ credits\ of\ all\ concerned\ subjects\ of\ all\ semesters}{Sum\ of\ credits\ of\ all\ the\ subjects\ in\ all\ the\ semesters}$$

$$= \frac{\sum_{1}^{s}\sum_{1}^{n}(Grade\ points\ X\ Credits)}{\sum_{1}^{s}\sum_{1}^{n} Credits}$$

Where s is the number of semesters and n is the number of subjects.

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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

MASTER OF TECHNOLOGY

I YEAR I SEM (2024-2026) AB

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MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

M.TECH I YEAR I SEM-(2024-2026AB)

Theory: 4 Hrs/week **Credits: 4**

Int Marks: 40M **Ext Marks:60 M**

Course objectives:

The student will be able to:

1. Introduce concepts of mathematical logic and Boolean circuits. Understand and perform operations associated with Elliptic Curves and Cryptography.
2. Grasp the fundamental concepts of formal languages, automata theory, and regular expressions.
3. Learn about different types of mathematical models of computation, such as deterministic and non-deterministic finite automata (DFA and NFA).
4. Learn the formal definition and operation of Turing machines, including their components and how they process input.

Course outcomes:

1. Ability to apply mathematical logic to solve problems.
2. Learn to use and manipulate regular expressions to describe regular languages.
3. Learn how to derive strings using CFGs and parse strings to determine if they belong to the language defined by a CFG.
4. Grasp how Turing machines recognize languages and solve computational problems.

UNIT – I

Mathematical notions of sets, sequences and tuples, functions and relations, Primitive recursive functions, computable functions, examples, graphs, strings and languages, Introduction to Number theory, Divisibility, modular arithmetic: addition modulo and multiplication modulo; Statements and applications of Euler's and Fermat's Theorems, Primitive Roots, Discrete Logarithms, Primality Test, Finding Large primes, Definition of Elliptic Curves and their applications to Cryptography.

UNIT – II

Finite Automata and Regular expressions: Alphabets and languages- Deterministic Finite Automata – Non- deterministic Finite Automata – Equivalence of Deterministic and Non-Finite Automata – Languages Accepted by Finite Automata – Finite Automata and Regular Expressions – Properties of Regular sets & Regular Languages and their applications.

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UNIT – III

Context Free Languages: Context –Free Grammar – Regular Languages and Context-Free Grammar – Pushdown Automata – Pushdown Automata and Context-Free Grammar – Properties of Context-Free Languages – pushdown automata and Equivalence with Context Free Grammars.

UNIT – IV

Turing Machines and Undecidability: Design and Techniques for Construction of Turing Machines, Undecidability of PCP. Chomsky Hierarchy, Regular Grammars, Unrestricted Grammars, Context Sensitive languages, Relationship between classes of languages.

TEXT BOOKS:

1. Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, & J.D. Ullman , Narosa publishing company.

REFERENCE BOOKS:

1. Theory of Computer Science By Mishra & Chandra Sekharan, PHI.

2. Introduction to languages and theory of computation – John C. Martin (MGH)

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DISTRIBUTED OPERATING SYSTEMS

M.TECH I YEAR I SEM-(2024-26AB)

Theory : 4 Hrs/week **Credits : 4**

Int Marks : 40M **Ext Marks : 60M**

Course Objective:

The student will be able to:

1. Grasp the fundamental concepts and principles of distributed systems, including their architecture and components.
2. Learn about various distributed algorithms for tasks such as synchronization, concurrency control, and load balancing.
3. Learn about various communication protocols and standards used in distributed systems, such as TCP/IP, RPC (Remote Procedure Call), and SOAP.
4. Understand techniques for synchronizing clocks in distributed systems, including logical clocks

Course Outcome:

1. Gain a solid understanding of the concepts and architecture of distributed operating systems.
2. Ability to implement and analyze distributed algorithms for synchronization, consensus, and fault tolerance.
3. Develop skills in handling concurrency and resource management in a distributed environment.
4. Proficiency in designing and implementing communication mechanisms and protocols in distributed systems.

UNIT-I

Distributed Operating Systems: Introduction, Definition, Goals, Connecting Users and resources transparency, Openness, Scalability, Hardware Concepts: Multiprocessors, Homogeneous and heterogeneous multi computer systems. Software Concepts: Distributed OS, Networking OS, Middleware. client server model: Clients and servers, Application layering, Architectures.

UNIT-II

Process: Threads-Threads in Distributed Systems. Client- User interfaces, Client-Side Software for distribution transparency. Servers-General design issues, Object servers. Code MigrationApproaches to code migration, migration and local resources, Migration in Heterogeneous systems. Software agents- Software agents in Distributed Systems, Agent Technology.

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UNIT-III

Communication: Layered Protocols-lower level, transport protocols, higher level protocols. Remote procedure call: Basic RPC operations, Parameter passing. Remote object invocation Distributed Objects, Binding a client to an object, Static versus Dynamic method invocation, Parameter passing. Message Oriented Communication-Persistence and Synchronicity in communication, message oriented-transient communication, message oriented persistent communication.

UNIT-IV

Synchronization: Clock Synchronization- Physical Clocks, Clock Synchronization Algorithms. Logical Clocks- Lamport Time Stamps, Vector Time Stamps. Global State. Election AlgorithmsBully and Ring Algorithms. Mutual Exclusion-Centralized Algorithm, Distributed Algorithm, Token Ring Algorithm. Distributed Transaction-The Transaction Model, Classification of Transactions, Implementation, Concurrency Control. Fault Tolerance: Introduction to Fault Tolerance, failure models, failure masking by redundancy.

TEXTBOOKS:

1. Distributed Systems by Andrew S,Tanenbum, Maarten Vansteen, Second Edition.
2. Distributed Operating Systems by Andrew S Tanenbaum Pearson Publications

REFERENCE BOOKS:

1. Operating System Concepts, Silberschatz & Galvin, Wiley.
2. Advanced Concepts in Operating Systems, M Singhal and NG Shivaratri, TMH.
3. Operating Systems:A Design Oriented Approach. Charles Crowley, Tata HillCo.
4. Modern Operating Systems, Andrew S,Tanenbum 2nd Edition,1995,PHI.
5. Advanced Concepts in Operating Systems. Distributed, Database and Multiprocessor Operating Systems. Mukeshshingal, Nirajan G.Shivaratri,TMH edn

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Data Mining Concepts and Applications

M.TECH I YEAR I SEM (2024-26AB)

Theory : 3 Hrs/week **Credits: 3**

Int Marks : 40M **Ext Marks : 60M**

Course objectives:

The student should be able to:

1. Grasp the fundamental principles of data warehousing and data mining.
2. Master various data mining techniques like clustering, classification, and association rule mining.
3. Perform Clustering techniques for data analysis.
4. Compare different data mining approaches and technologies.

Course outcomes:

1. Gain a solid understanding of data mining concepts and technologies.
2. Develop practical skills in designing, implementing, and managing data sets.
3. Demonstrate proficiency in processes for data integration.
4. Apply various data mining techniques to extract meaningful insights from large datasets of real worlds.

UNIT - I

Introduction of Data Mining: Motivation and importance, what is data mining, data mining on what kind of data, what kinds of patterns can be mined.

Data Pre-processing: Forms of data pre-processing, pre-processing tasks: measures of central tendency, measures of dispersion, graphic display of data summaries

Data Cleaning: Dealing with missing values, noisy data, techniques for data integration, data transformation, and data reduction.

UNIT – II

Proximity Measures: Similarity and dissimilarity measures for categorical, ordinal, ratio and interval scaled distribution.

Mining Frequent Patterns: Market basket analysis, frequent items set mining methods: apriori method, generating association rules, improving the efficiency of apriori, patteren-growth approach for mining frequent items sets, mining frequent item sets using vertical data format.

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UNIT – III

Classification: working of a decision tree, how to build a decision tree, methods for expressing attribute test conditions, measures for selecting the best split, algorithm for decision tree induction, characteristics of decision tree induction; Bayes classification method, support vector machines
Clustering: Classical partitioning methods: k- Means and k-Medoids, Agglomerative hierarchical clustering method; DB SCAN Density based method.Outlier analysis.

UNIT – IV

Data Mining in Different Domains: mining data streams, mining time series, graph mining, social network analysis, spatial data mining, multi dimensional data mining, web data mining.
Data Mining Applications: data mining for financial data analysis, data mining for the retail industry, data mining for the telecommunication industry, data mining for biological data analysis, data mining for other scientific applications, data mining for intrusion detection.

Text Books:

1. Data Mining Concepts and Techniques - Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, 4rd edition
2. Introduction to Data Mining – Pang-Ning Tan, Vipin Kumar and Michael Stenbach, Pearson India, 2nd edition

Reference Books:

1. Data Mining: Practical Machine Learning Tools and Techniques – Ian H Witten and Eibe Frank, Elsevier Publication, 2nd edition
2. Introduction to Data Mining with Case Studies – G K Gupta, PHI Learning, 3rd edition

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ADVANCED DATA STRUCTURES

M.TECH. I YEAR ISEM (2024-26AB)

Theory : 3 Hrs/week **Credits: 3**

Int Marks: 40M **Ext Marks: 60M**

Course objectives:

The student should be able to

1. Choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
2. Understand the necessary mathematical abstraction to solve problems.
3. To familiarize students with advanced paradigms and data structures for solving algorithmic problems.
4. Come up with an analysis of efficiency and proof of correctness.

Course Outcomes:

1. Understand the implementation of a symbol table using hashing techniques.
2. Develop and analyze algorithms for red-black trees, B-trees, and Splay trees.
3. Develop algorithms for text processing applications.
4. Identify suitable data structures and develop algorithms for computational geometry Problems
5. Implement the concepts of trees in various applications.

UNIT-I

DICTIONARIES AND HASHING: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries. **Hashing**: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing,Rehashing, Extendible Hashing.

UNIT-II

Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists.

Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees.

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UNIT-III

Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

UNIT-IV

Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad-trees, k-D Trees. Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem.

Text Books:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

Reference Books:

1. Data structures and Algorithms in C++, Michael T. Goodrich, R.Tamassia and D.Mount, Seventh EditionWiley student edition, John Wiley and Sons.
2. Data Structures and Algorithms in C++, Third Edition, Adam Drozdek, Thomson
3. Problem-solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.
4. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
5. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI/Pearson Education

Object Oriented Software Engineering

M.TECH I-YEAR I-SEM-(2024-26AB)

Theory: 3 Hrs/week **Credits: 3**

Int Marks : 40M **Ext Marks: 60M**

Course objectives:

The student should be able to

1. Learn the foundational concepts of software engineering, including the software development life cycle (SDLC)
2. Apply object-oriented design principles to create robust and scalable software systems.
3. Gain Unified Modeling Language (UML) proficiency to create diagrams representing system structure and behavior.
4. Understand different software architecture styles and common design patterns to solve recurring problems.
5. Learn project management techniques to effectively plan, execute, and monitor software development projects.

Course Outcomes:

1. Students can design and analyze software systems using object-oriented principles effectively.
2. Students will demonstrate the ability to use Unified Modeling Language (UML) to model software systems.
3. Students will be adept at recognizing and applying common design patterns to solve recurring software design problems.
4. Students will gain skills in managing software projects, including planning, scheduling, and tracking progress using various project management tools and techniques.

UNIT-1

Introduction to Object Oriented Software Engineering

Nature of The Software, Types of Software, Software Engineering Projects, Software Engineering Activities, Software Quality, Introduction to Object Orientation, Concepts of Data Abstraction, Inheritance & Polymorphism, Software Process Models-Waterfall Model, The Opportunistic Model, The Phased Released Model, The Spiral Model, Evolutionary Model, The Concurrent Engineering Model, Agile Model.

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UNIT-II

Requirements Engineering: Domain Analysis, Problem Definition and Scope, Requirements Definition, Types of Requirements, Techniques for Gathering and Analyzing Requirements, Requirement Documents, Reviewing, Managing Change in Requirements. **Unified Modeling Language & Use Case Modeling:** Introduction to UML, Modeling Concepts, Types of UML Diagrams with Examples; User-Centered Design, Characteristics of Users, Developing Use Case Models of Systems, Use Case Diagram, Use Case Descriptions, The Basics of User Interface Design, Usability Principles, User Interfaces.

UNIT-III

Class Design and Class Diagrams: Essentials of UML Class Diagrams, Associations and Multiplicity, Other Relationships, Generalization, Instance Diagrams, Advanced Features of Class Diagrams, Interaction and Behavioral Diagrams: Interaction Diagrams, State Diagrams, Activity Diagrams, Component and Deployment Diagrams.

Software Design and Architecture: The Process of Design, Principles Leading to Good Design, Techniques for Making Good Design Decisions, Writing A Good Design Document., Pattern Introduction, Design Patterns: The Catalog of Design Patterns; Software Architecture Contents of An Architecture Model, Architectural Patterns: The Multilayer, Client-Server, Broker, Transaction Processing, Pipe & Filter And MVC Architectural Patterns

UNIT-IV

Software Testing: Overview of Testing, Testing Concepts, Testing Activities, Testing Strategies, Unit Testing, Integration Testing, Function Testing, Structural Testing, Regression Testing, Performance Testing, System Testing, Acceptance Testing, Installation Testing, OO Test Design Issues, Root Cause Analysis, Post- Mortem Analysis.

Software Project Management: Introduction to Software Project Management, Activities of Software Project Management, Structure of Project Plan, Software Engineering Teams, Software Cost Estimation, Project Scheduling, Tracking and Monitoring.

Text Book:

1. Object-Oriented Software Engineering Practical software development using UML and Java by Timothy C. Lethbridge& Robert, Langaniere McGraw-Hill

References:

1. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education Asia.
2. Software Engineering: A Practitioner's Approach, Roger SPressman
3. A Practical Guide to Testing Object-Oriented Software, John D. McGregor; David A. Sykes, Addison-Wesley Professional

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M.TECH

I-YEAR I-SEM (2024-2026AB)

LABS

Object Oriented Software Engineering Lab

M.TECH I-YEAR I-SEM (2024-2026AB)

Lab : 3 Hrs/week **Credits : 2**

Int Marks : 50M **Ext Marks : 50M**

1. The purpose of the Software Engineering Lab course is to familiarize the students with modern software engineering methods and tools, Rational **Products**. The course is realized as a project-like assignment that can, in principle, by a team of three/four students working full time. Typically, the assignments have been completed during the semester requiring approximately 60-80 hours from each project team.
2. The goal of the Software Engineering Project is to have a walk through from the requirements, design to implementing and testing. An emphasis is put on proper documentation. Extensive hardware expertise is not necessary, so proportionate attention can be given to the design methodology.
3. Despite its apparent simplicity, the problem allows plenty of alternative solutions and should be a motivating and educating exercise. Demonstration of a properly functioning system and sufficient documentation is proof of a completed assignment
4. Term projects are projects that a group student or might take through from initial specification to implementation. The project deliverables include

Projects Documentation including

- A Problem Statement
- A Requirements Document
- A Requirements Analysis Document.
- A System Requirements Specification.
- A Software Requirements Specification.
- A Design Document
- A Software Design Description and a System Design Document.
- A Test Specification.
- Manuals/Guides for -Users and associated help frames
- Programmers, Administrators (installation instructions)
- A project plan and schedule setting out milestones, resource usage and estimated costs.
- A quality plan setting out quality assurance procedures
- An implementation.

CASESTUDY: Simple Chat Instant Messaging System, GPS Based Automobile Navigation System, Waste Management Inspection Tracking System(WMITS), Geographical Information System.

Reference Books:

1. Project-based software engineering: An Object-oriented approach, Evelyn Stiller, Cathie LeBlanc, Pearson Education
2. Visual Modelling with Rational Rose2002 and UML, Terry Quatrain, Pearson Education
3. UML2 Toolkit, Hans -Erik Eriksson, etc; Wiley

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ADVANCED DATA STRUCTURES LAB

M.TECH I YEAR I SEM (2024-2026AB)

Lab : 3 Hrs/week **Credits : 2**

Int Marks : 50M **Ext Marks : 50M**

LIST OF EXPERIMENTS

1. Write a program to implement Dictionary ADT using hashing.
2. Write a program to store k keys into an array of size n at the location computed using a hash function, loc = key % n, where k<=n and k takes values from [1 to m], m>n.
   To handle the collisions use the following collision resolution techniques,
   a. Linear probing
   b. Quadratic probing
   c. Random probing
   d. Double hashing/rehashing
3. Write a program for Binary Search Tree to implement the following operations:
   a. Insertion
   b. Deletion
      i . Delete node with only child
      ii. Delete node with both children
   c. Finding an element
   d. Finding Min element
   e. Finding Max element
   f. Left child of the given node.
4. Write a program for AVL Tree to implement all cases (LL, RR, RL, LR rotation)
5. Write a program to implement Red-Black trees with insertion and deletion operations for the given input data as Strings.
6. Write a program to transform BST into AVL trees and also count the number rotations performed.
7. Write a program to implement insertion, deletion, display and search operation in m-way B tree (i.e. a non-leaf node can have almost m children) for the given data as integers (Test the program for m=3, 5, 7).
8. Write a program to perform string matching using the Knuth-Morris-Pratt algorithm.
9. Write a program to perform string matching using the Boyer-Moore algorithm.
10. Write a program to implement Huffman Coding.
11. Write a program to implement QuadTree.
12. Write a program to implement the k-D Tree

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DATA MINING CONCEPTS AND APPLICATIONS LAB
M.TECH I YEAR I SEM (2024-2026AB)

Lab : 3 Hrs/week **Credits : 2**
Int Marks : 50 M **Ext Marks : 50M**

Lab Module 1: Explore the following tasks using Excel

- Data Cleaning Basics: Remove duplicates, deal with missing values, normalize data
- Exploratory Data Analysis (EDA) and Visualization: Descriptive statistics, pivot tables and visualization using different charts
- Data Analysis ToolPak: ANOVA for Comparing Multiple Groups, t-Test for Hypothesis Testing, Simple Linear Regression for Predictive Modeling

Lab Module 2: Demonstrate the following using Python

- Data types
- Statistical functions
- Data preprocessing and attribute selection
- Graphical representation of data
- Data Cleaning and Transformation
- Linear Regression
- Feature selection with InfoGain
- Classification, Clustering

Lab Module 3: Real-World Project

- Choose a real-world dataset and identify a problem to solve.
- Follow the entire process: data collection, preprocessing, EDA, model selection, evaluation, and deployment (if applicable).
- Present findings and discuss potential real-world applications and challenges.

References:

1. Wayne L. Winston, Microsoft Excel Data Analysis and Business Modeling, Microsoft Press
2. Dr Reema Thareja, Data Science and Machine Learning using Python, Mc Graw Hill.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
M. TECH (CSE) I YEAR I SEMESTER

OBJECT-ORIENTED SOFTWARE ENGINEERING

(Model Question Paper)

Time: 3Hrs Max Marks: 60M

SECTION- A

I.Answer ALL Questions **4 X 10=40M**

1. (a) Describe any five Software Process Models.

(OR)

(b) Explain Object Oriented Concepts.

(c) Discuss different types of software are with examples.

2. (a) What is a Domain? Define Problem and Scope for "Air Traffic Control System".

(OR)

(b) Define Use Case. Develop Use Case models for "Simple Chat Instant Messaging System".

3. (a) Discuss in depth about implementation of Association in a Class Diagram with Examples.

(OR)

(b) What is a Design Pattern? Discuss the Catalogue of Design Patterns.

4. (a) Discuss different Testing Strategies with examples.

(OR)

(b) What are Software Project Management Activities? Explain.

SECTION- B

II. Answer *any Four* the questions **4 X 5=20M**

a) Explain S/W engineering activities.

b) Discuss S/W quality measures.

c) Differentiate between the Phased released model and Concurrent engineering model.

d) Write about the Requirements Document.

e) How Modelling is important for Good Design.

f) Discuss MVC Architectural Pattern.

g) What is Post Mortem Analysis

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ADIKAVI NANNAYA UNIVERSITY::UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE
M. TECH (CSE) I YEAR I SEMESTER
ADVANCED DATA STRUCTURES
(Model Question Paper)

Time: 3Hrs Max Marks: 60M

SECTION-A

I. Answer *ALL* questions **4 X 10=40M**

1. a) Explain and Construct AVL Tree with suitable example.

OR

b) Explain and Construct Splay Tree with suitable example.

2. a) Explain Collision Resolution Hashing Techniques and its.

OR

b) Write a Java Program to implement Binary Search Tree along with suitable example.

3. a) Propose a hybrid pattern matching algorithm combining the best features of the Boyer-Moore and Knuth-Morris-Pratt algorithms.

OR

b) Explain the process of solving the Longest Common Subsequence (LCS) problem using Dynamic Programming. Derive the complexity for an example.

4. a) Describe the construction and searching process of k-D Trees. How are they used in nearest-neighbour queries?

OR

b) Describe the algorithm for two-dimensional range searching. How does it differ from one-dimensional range searching?

SECTION-B

II.Answer *any Four* the questions **4 * 5=20M**

a) Define Dictionary Abstract Data Type.

b) Explain the rules of B-trees.

c) Explain the operations of Single linked list.

d) Discuss the structure and usage of Standard Tries with an example.

e) constructing a Huffman Tree with an example.

f) How does a Priority Search Tree handle range queries efficiently?

g) Explain the structure of a Quad Tree and its use in partitioning two-dimensional spaces.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
I M.TECH - I SEMESTER

DISTRIBUTED OPERATING SYSTEMS

MODEL QUESTION PAPER

Time: 3 hours **Maximum Mark:** 60M

SECTION-A

I Answer all the questions **4*10=40 marks**

1 a) Explain about Distributed Operating Systems?

(or)

b) Explain about client-server model?

2 a) Explain about Threads in Distributed Operating Systems?

(or)

b) Explain about Servers in Distributed Operating Systems?

3 a) Explain about layered protocols in Distributed Systems?

(or)

b) Explain about remote procedure calls in distributed systems?

4 a) Explain about transactions in distributed systems

(or)

b) Explain about fault tolerance in distributed systems?

SECTION-B

II Answer any four questions **4*5=20 marks**

a) Write in short about software concepts in distributed systems?

b) Write about clients in distributed systems?

c) Write about code migration in distributed systems?

d) Write about types of message oriented communication in short?

e) Write in shot about clock synchronization algorithms?

f) Write about mutual exclusion centralized and distributed algorithms in distributed systems?

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M. TECH (CSE) I YEAR I SEMESTER

DATA MINING CONCEPTS AND APPLICATIONS

(Model Question Paper)

Time: 3Hrs Max Marks: 60M

SECTION- A

I Answer All *Questions* **4 X 10=40M**

1. (a) Explain the significance of data preprocessing in the data mining process. Discuss the main tasks involved in data preprocessing, providing relevant examples for each.

(OR)

(b) Discuss how dimensionality reduction techniques and sampling methods contribute to improving the efficiency and scalability of data mining algorithms.

2. (a) Explain the pattern-growth approach for mining frequent item sets

(OR)

(b) Describe the Apriori algorithm for frequent itemset mining. Explain the process of generating association rules from frequent item sets.

3. (a) Explain the process of building a decision tree and measures for selecting the best split through Gini Index, Information Gain

(OR)

(b) Explain DB SCAN Density method with an example.

4. (a) Explain the process and challenges associated with mining data streams and mining time **series**. Provide examples of applications in different domains where these techniques are commonly used.

(OR)

(b) Explain how data mining for financial data analysis is applied in the banking and financial sector. Provide examples of techniques like regression, classification, and clustering that are used to extract insights from financial data.

SECTION- B

II. Answer *any Four* the questions **4 X 5=20M**

a) A dataset contains the following five numerical values: **8, 12, 15, 10, and 20. Find the measures of central tendency and measures of dispersion.**
b) A company collects customer feedback scores ranging from 1 to 10 for a product. Apply **data cleaning** techniques to identify outliers in the data: **[8, 7, 10, 9, -5, 6, 50, 8, 7, 9]**
c) Explain how the efficiency of the Apriori algorithm can be improved.
d) Given two sets of items representing purchases by two customers: **Customer A:** {Bread, Milk, Butter, Eggs} **Customer B:** {Bread, Butter, Cheese, Eggs}. Calculate the **Jaccard Coefficient** to measure the similarity between the two sets. Interpret the result in terms of similarity between the purchasing habits of the two customers.
e) Explain the working of the **Bayes classification method**
f) Suppose you want to find who are the real friends using k-means clustering. 3 groups of friends are represented by A1(2,10), A2(2,5), A3(8,4), B1(5,8), B2(7,5), B3(6,4), C1(1,2), C2(4,9). Assume A1,B1,C1 as the center of each cluster. Use K-means algorithm to show the cluster centers after the first round of execution.
g) Provide a brief example of an application where spatial data mining is useful.

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M. TECH (CSE) I YEAR I SEMESTER
MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE
(Model Question Paper)

Time: 3Hrs Max Marks: 60M

Section A

I.Answer *ALL* questions **4 X 10=40M**

1. a) Explain about Euler's and Fermat's Theorems.

OR

b) Define Elliptic Curves and their applications to Cryptography.

2. a) Explain modular arithmetic: addition modulo and multiplication modulo.

OR

b) Explain about Deterministic Finite Automata with suitable example.

3. a) Explain about Non- Deterministic Finite Automata with suitable example

OR

b) Explain about Properties of Regular sets &Regular Languages and their applications.

4. a) Design and Techniques for Construction of Turing Machines.

OR

b) Describe the Pushdown Automata with an Example.

Section B

II.Answer *any Four* the questions **4 X 5=20M**

a) Define sets, sequences and tuples.

b) Explain functions and relations, Primitive recursivefunctions, computable functions, graphs.

c) Explain the Context –Free Grammar with examples.

d) Discuss the Regular Expressions with examples.

e) Explain about Chomsky Hierarchy.

f) Explain about Regular Grammars, Unrestricted Grammars?

g) Explain the Context-Free Languages and Context Sensitive languages.

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