Hall Ticket No: | | | | | | | | | | | Question Paper Code: 24CSEP101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

M.Tech I Year I Semester (R24) Regular End Semester Examinations, March - 2025

ADVANCED DATA STRUCTURES AND ALGORITHMS

(Computer Science & Engineering)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.No 1 to 5 answer either A or B only

Q.No	Question	Marks	CO	BL
Q.1(A)	Analyze the impact of data structure selection on the efficiency of algorithms. How do dictionary-based data structures compare in terms of time and space complexity?	12M	1	4
	OR			
Q.1(B)	The keys 12,18,13,2,3,23,5,15,28 and 22 are inserted into an initially empty hash table of the length 10 using open addressing with hash function h(k) = k mod 10 and apply different probing technique analyze the best collision avoidance technique.	12M	1	4
Q.2(A)	Construct an AVL Tree with following data: 10 15 9 12 13 79 45 36 22. What do you mean by a balance factor in AVL tree and explain about different rotations with suitable algorithms.	12M	2	3
	OR			
Q.2(B)	Describe the construction of Red Black Tree. Write an algorithm for Insertion operation in red-black tree and analyze the same. Construct a red-black tree with the following values: 8,18,5,15,17,25,40,80 and delete 40, 15.	12M	2	3
Q.3(A)	Compare the height and structural properties of B-Trees and 2-3 Trees. When would a B-Tree be preferred over a 2-3 Tree?	12M	3	4
	OR			
Q.3(B)	Analyze the process of inserting a sequence of values {50, 30, 70, 20, 40, 60, 80} into a splay tree and explain how the tree structure evolves after each insertion. After constructing the tree, evaluate the effect of deleting the node with value 30 and discuss how the tree is modified as a result.	12M	3	4
Q.4(A)	Describe in detail about Boyer Moore algorithm with suitable algorithm.	12M	4	3
	OR			
Q.4(B)	Assess the role of Suffix Tries in bioinformatics and text compression. How do they improve search efficiency in large datasets?	12M	4	5
Q.5(A)	Justify why k-D Trees are preferred over Quadtrees in nearest neighbour searches. What modifications can be made to k-D Trees to handle dynamic data efficiently?	12M	5	3
	OR			
Q.5(B)	Given the following set of points {(3,6), (17,15), (13,15), (6,12), (9,1),(2,7)}, construct a 2D k-D Tree and show a range search for $x \in [4,14]$ and $y \in [3,13]$.	12M	5	3

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Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 24CSEP102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

M. Tech I Year I Semester (R24) Regular End Semester Examinations, March - 2025

ADVANCED DATABASES

(Computer Science & Engineering)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.No 1 to 5 answer either A or B only

Q.No	Question	Marks	CO	BL
Q.1(A)	A database has three tables: Employees(EmployeeID, Name, DepartmentID) Departments(DepartmentID, DepartmentName) Projects(ProjectID, ProjectName, EmployeeID) **Questions:** Analyze the relationships between these tables and write a Relational Algebra expression to retrieve the names of employees working on the "Database Upgrade" project. How would you use the join (⋈) operator to combine data from the Employees and Departments tables?	12M	1	4
	OR			
Q.1(B)	A student is confused about the difference between full functional dependency and partial functional dependency. **Questions:** Explain the concept of full functional dependency with an example. How does partial functional dependency differ from full functional dependency? Provide an example to illustrate the difference.	12M	1	2
Q.2(A)	You are designing an XML document to store information about a university's courses and students. **Questions:** Design an XML schema (XSD) to represent courses, students, and their enrollments. Write an XQuery to retrieve the names of all students enrolled in a specific course.	12M	2	5
	OR			

Q.2(B)	A company stores employee data in an XML document:
	`<employees>`
	`<employee id="101">`
	`<name>John Doe</name>`
	`<department>HR</department>`
	`<salary>50000</salary>`
	`</employee>`
	`<employee id="102">`
	`<name>Jane Smith</name>`
	`<department>IT</department>`
	`<salary>60000</salary>`
	`</employee>`
	`</employees>`
	Analyze the structure of the XML document and identify the relationships between elements.
	How would you transform this XML data into a relational database schema?
		12M	2	4

Q.3(A)	Analyze how CRUD operations in MongoDB differ from those in a relational database like MySQL. Discuss the implications of these differences on performance and flexibility.	12M	3	4

OR

Q.3(B)	You are building a web application for a blog using MongoDB, PHP, and Java. Questions: Write a PHP script to insert a new blog post into a MongoDB collection. Write a Java program to retrieve all blog posts from a MongoDB collection and display them.	12M	3	3
Q.4(A)	Analyze the impact of web database architectures (client-server, three-tier, cloud-based) on the performance of real-time applications like Facebook, Twitter.	12M	4	4
	OR			
Q.4(B)	A database administrator is deciding whether to use fragmentation or replication for a customer's table. **Questions:** Evaluate the trade-offs between fragmentation and replication for the Customers table. Justify why replication might be a better choice for a Products table that is frequently read but rarely updated.	12M	4	5
Q.5(A)	Assess a security strategy that combines firewall protection, input validation, and access controls to protect a web-based database from injection attacks. Analyze how each component contributes to preventing vulnerabilities and ensuring data security.	12M	5	4
	OR			
Q.5(B)	Evaluate the benefits and drawbacks of implementing Public Key Infrastructure (PKI) to secure sensitive data in a distributed database system. Discuss its impact on data confidentiality, integrity, and scalability, as well as potential challenges in key management and performance.	12M	5	5

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Hall Ticket No: | | | | | | | | | | | Question Paper Code: 24CSEP401

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

M. Tech I Year I Semester (R24) Regular End Semester Examinations, March - 2025

ENTERPRISE CLOUD COMPUTING

(Computer Science & Engineering)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.No 1 to 5 answer either A or B only

Q.No	Question	Marks	CO	BL
Q.1(A)	Explain in detail about the common risks and Challenges associated with adopting cloud computing in detail.	12M	1	2
	OR			
Q.1(B)	Illustrate the major characteristics considered by cloud providers and consumers to measure the value offer of cloud platform.	12M	1	3
Q.2(A)	Elaborate the roles and mechanisms of Logical Network Perimeter and Virtual Server in the Cloud Infrastructure Mechanisms	12M	2	3
	OR			
Q.2(B)	Illustrate the roles of broadband networks and internet architecture in the enterprise cloud computing in detail.	12M	2	3
Q.3(A)	Demonstrate the steps to implement workload distribution architecture in a cloud environment.	12M	3	3
	OR			
Q.3(B)	Discuss in detail about how cloud bursting can be implemented to handle networking spikes.	12M	3	2
Q.4(A)	Write a detailed note on Revisiting the Enterprise Journey	12M	4	2
	OR			
Q.4(B)	How does a service-oriented architecture (SOA) enable an enterprise to become more flexible and adaptable? Explain in detail.	12M	4	3
Q.5(A)	Identify different cloud contract management tools and recommend the best one for enterprises cloud environment.	12M	5	3
	OR			
Q.5(B)	Differentiate between private clouds and enterprise cloud with illustration.	12M	5	3

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Hall Ticket No: | | | | | | | | | | | Question Paper Code: 24CSEP404

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

M.Tech I Year I Semester (R24) Regular End Semester Examinations, March - 2025

ADVANCED CRYPTOGRAPHY

(Computer Science & Engineering)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.No 1 to 5 answer either A or B only

Q.No	Question	Marks	CO	BL
Q.1(A)	Analyze the matrix and modulus arithmetic processes involved in the encryption and decryption steps of the cryptosystem when the readable message is 'GATE' and the cipher keys are 'ISBN'. Break down how these operations contribute to securing the communication between the sender and receiver.	12M	1	4
	OR			
Q.1(B)	Illustrate the differences between a Secret-Key Cryptosystem and a Public-Key Cryptosystem by creating a diagram or flowchart that demonstrates the key exchange, encryption, and decryption processes for each system.	12M	1	3
Q.2(A)	Cryptographic systems often rely on the mathematical structures of groups, rings, fields, and finite fields. Consider with your own scenarios and apply the relevant concepts to solve them.	12M	2	3
	OR			
Q.2(B)	Examine the key scheduling algorithm (KSA) and pseudorandom generation algorithm (PRGA) in RC4. How do these components work together to produce the keystream?	12M	2	3
Q.3(A)	Using Fermat's primality test, analyze the steps to determine if the number 5 is a prime number. Then, apply the Miller-Rabin primality test to evaluate the primality of the number 561. Compare the results and explain any discrepancies or insights observed in the process.	12M	3	3
	OR			
Q.3(B)	Create a RSA encryption and decryption system using the given Plain Text M= 11 and the prime numbers p=7, q=17,e=11.	12M	3	3
Q.4(A)	Evaluate the differences between SHA-1, SHA-256, and SHA-3. Justify the selection of a specific SHA algorithm for an application like blockchain, digital signatures, or password hashing.	12M	4	4
	OR			
Q.4(B)	Evaluate the role of digital signatures within authentication protocols in securing communication systems. Compare the effectiveness of digital signature-based protocols, such as SSL/TLS, against non-signature-based authentication methods.	12M	4	3
Q.5(A)	Design an authentication protocol using a symmetric key shared between the server and the client in Challenge-and-Response in the Secret-Key Setting and also Design a separate protocol leveraging public-private key pairs for mutual authentication in public -Key Setting.	12M	5	3
	OR			
Q.5(B)	Compile a detailed explanation of the Schnorr Identification Scheme protocol. Include its three main steps and explain how zero-knowledge properties are satisfied.	12M	5	2

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Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 24RMP101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

M.Tech I Year I Semester (R24) Regular End Semester Examinations, March - 2025

RESEARCH METHODOLOGY AND IPR

(Common to VLSI and CSE)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.No 1 to 5 answer either A or B only

Q.No	Question	Marks	CO	BL
Q.1(A)	Explain the different types of research and their significance in problem formulation. Discuss the role of a literature review in identifying the research gap.	12M	1	2
	OR			
Q.1(B)	Explain the objectives and types of research. Describe the research process and different research approaches. Discuss the importance of a literature review, including information sources, retrieval tools, indexing services, and citation indexes. How can a research gap be identified and hypothesized.	12M	1	2
Q.2(A)	Define and explain the different types of experimental designs used in research. Elaborate on each type with suitable examples, highlighting their significance, strengths, and limitation	12M	2	2
	OR			
Q.2(B)	Compare between Primary Data and Secondary Data with appropriate examples. Additionally, explain the classification of data with relevant illustrations.	12M	2	2
Q.3(A)	Interpret the Mean, Median, Mode, Range, and Standard Deviation for the given dataset: {2, 5, 7, 6, 4, 8}. Show all necessary steps and calculations.	12M	3	2
	OR			
Q.3(B)	Explain the term plagiarism, and why is it a serious concern in academic and research writing? Discuss various online tools used for detecting plagiarism. As a researcher, what precautions should be taken to ensure the publication of a plagiarism-free report.	12M	3	2
Q.4(A)	Explain the importance of intellectual property rights. Explain the role of WTO in promoting IPR.	12M	4	2
	OR			
Q.4(B)	Explain the following intellectual property rights (IPRs) in brief, highlighting their significance and key features: (a) Patents (b) Designs (c) Trademarks (d) Copyright	12M	4	2
Q.5(A)	List and identity the categories of inventions that are non-patentable and write a short note on that. Provide examples to justify why these inventions do not qualify for patent protection.	12M	5	3
	OR			
Q.5(B)	An entrepreneur has developed an innovative wearable health tracker. Apply your understanding of patents to explain the filing process. Discuss the advantages of patent protection and analyze the role of licensing in business growth and international expansion.	12M	5	3

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