

Total No. of Pages: 01

MrTech cse Sem, 1, 2, 3

Date of Examination: 30/04/2026

Max. Marks: 60



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Total No. of Pages: 02

Total No. of Questions: 08

M.Tech. (Computer Science & Engineering), Semester: 1st

ADVANCED DATA STRUCTURES

Subject Code: 25C1CSP-102

M.Code: 96667

Date of Examination: 06-05-2026

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Compare Separate Chaining and Open Addressing in terms of time and space complexity. Which technique is preferable when the load factor is high? Justify your answer.	CO1	L4
2a.	Explain the effectiveness of Bloom filters for web caching and network intrusion detection. Provide supporting arguments with limitations.	CO2	L2
2b.	Apply the routines to perform insertion and deletion in Skip Lists. Demonstrate how searching differs from insertion and deletion operations.	CO2	L3
3.	Create algorithms for Skip List Insertion and Searching, detailing the steps, pointer updates and level management involved in each operation.	CO2	L6
4.	Construct a B-Tree of order 3 by inserting keys [19, 30, 36, 10, 40, 25, 33] into an empty tree and show every insertion step with any node splits. Also, remove key 30 from the final tree using B-Tree deletion rules.	CO3	L3
5a.	Classify different collision resolution techniques in Hashing with the help of an example and explain how Linear Probing resolves collisions.	CO1	L2
5b.	Explain the Quadratic Probing with an example. Also, outline the need for Double Hashing in resolving collisions.	CO1	L2
6.	Evaluate advanced text-processing techniques for large string data by comparing Standard, Compressed, and Suffix Tries for pattern and prefix searching, with appropriate justification and examples of each technique.	CO4	L5
7a.	Build an algorithm for Brute Force pattern matching and analyze its time complexity with a suitable example.	CO4	L3
7b.	Suppose eight characters have a distribution A(1), B(1), C(1), D(2), E(3), F(5), G(5), H(10). Construct a Huffman tree and calculate the average number of bits needed for each character	CO4	L3

8	Design a 2D range-search algorithm (using k-D Trees or Priority Range Trees) to report all points in a rectangular query: show construction, justify choices and propose a hybrid improvement that reduces query time and handles unbalanced data.	CO5	L6
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M.Tech (CSE), Semester-1st

MACHINE LEARNING

Subject Code: 25C1CSP-PE1-01

M.Code: 96666

Date of Examination: 13/05/2026

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Compare and contrast the utility of VC-dimension and Rademacher complexity as measures of a hypothesis class's capacity.	CO1	L4
2.a.	Explain the concept of supervised learning. Illustrate your answer with a suitable classification problem, describing how the model is trained and how it makes predictions.	CO2	L2
2.b.	Classify the applications of Machine Learning into different categories. Explain each category with suitable examples	CO2	L2
3.	Develop an active learning system for fraud detection in financial transactions. Explain how it reduces labelling cost.	CO2	L3
4.	Distinguish between stochastic gradient descent (SGD) and gradient descent (GD)?	CO3	L4
5.a.	Explain what are the various metrics used to evaluate the machine learning model performance.	CO3	L5
5.b.	Elaborate Reinforcement Learning, Give an Example, implementation and write down its uses.	CO3	L6
6.	Determine autoregressive (AR) or ARIMA models to forecast temperature data collected from IoT sensors.	CO4	L5
7.a.	Identify how convolutional neural networks (CNNs) learn hierarchical feature representations.	CO4	L3
7.b.	Distinguish between Recurrent Neural Network (RNN), Long Short-Term Memory (LSTM), and Gated Recurrent Unit (GRU) models used for sequence modelling.	CO4	L4
8	Examine how deep learning techniques such as CNNs and RNNs have influenced recent advancements in machine learning.	CO5	L5

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M.Tech (CSE), Semester-1st
DATA SCIENCE
Subject Code: 25C1CSP-PE2-01
M.Code: 96662
Date of Examination: 16/05/2026

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.
- 3.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Identify the real-world application of Data Science in healthcare / finance / e-commerce / social media. Describe the data used, process followed, and outcome.	CO1	L3
2.a.	Interpret different categories of Machine Learning algorithms. Give examples.	CO2	L2
2.b.	Explain the stages of Data Analysis and show how it supports decision-making.	CO2	L2
3.	Analyze the different data storage and management systems.	CO2	L4
4.	Identify and briefly explain three distinct applications of Data Science.	CO3	L3
5.a.	Explain various technologies and tools used for data visualization.	CO3	L5
5.b.	Compare open-source tools (Tableau Public, Power BI, Python libraries) with commercial visualization software.	CO3	L5
6.	Evaluate Bokeh's effectiveness compared to other visualization libraries such as Matplotlib, Seaborn or Plotly. What are its strengths and weakness.	CO4	L5
7.a.	Examine the recent trends in data analysis techniques.	CO4	L4
7.b.	Compare and contrast data types, retinal variables, and visual encodings. How do they collectively contribute to effective data visualization?	CO4	L4
8	Assess the different application development methodologies used in Data Science.	CO5	L5

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M.Tech (CSE), Semester-2nd

SOFT COMPUTING

Subject Code: 25C1CSP-202/MTCS-202-18

M.Code:76056

Date of Examination: 07-05-2026

Time: 3 Hrs.

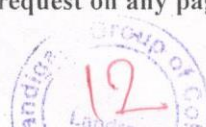
Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Analyze the concept of soft computing with its constituents and their significance. Discuss how soft computing differs from conventional computing methods.	CO1	L4
2.a.	Illustrate the properties which a fuzzy set A on R (set of real numbers) must possess to qualify as a fuzzy number? Explain any four arithmetic operations on closed interval with examples.	CO2	L2
2.b.	Explain fuzzy expert system and their components. Discuss how fuzzy decision making is applied in various fields.	CO2	L2
3.	Make use of architectural diagram to explain the process of a fuzzy controller. List out the various assumptions required to design an effective fuzzy controller.	CO2	L3
4.	Examine the architecture of Mc Culloch – Pitts neuron model and also realize 3-input NAND gate, NOR gate using the above neuron model.	CO3	L4
5.a.	Formulate output equations and weight update equations for a multilayer feed forward neural network using back propagation algorithm.	CO3	L6
5.b.	Elaborate the importance of reinforcement learning in neural networks. Discuss the role of Radial basis function network	CO3	L6
6.	Discuss the latest developments in soft computing. Provide examples of how these techniques are being implemented in various fields.	CO4	L6
7.a.	Identify the need of mutation operator in GA and its operations.	CO4	L3
7.b.	Analyze the basic principle of Genetic Algorithm? How this method can be used in Machine Learning.	CO4	L4
8.	Elaborate the implementation of the GA or the fuzzy logic MATLAB toolbox. Discuss the steps to simulate the same.	CO5	L6

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M.Tech (CSE), Semester- 2nd

Subject Code: 25C1CSP-201/ MTCS 201-18

M.Code: / 76055

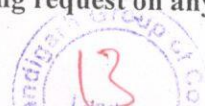
Date of Examination: 04/05/2026

Time: 3 Hrs.

Max. Marks: 60

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

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M.Tech (CSE), Semester-2nd

COMPUTER VISION

Subject Code: 25C1CSP-PE3-01/MTCS-208-18

M.Code: 76059/97887

Date of Examination: 11/05/2026

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Analyze the components and functioning of computer imaging systems; including the role of lenses in image formation. Calculate the focal length of a lens if an object at 150 mm from the lens produces an image at 300mm.	CO1	L4
2.a.	Outline the concept of Harris corner detector and its applications with examples.	CO2	L2
2.b.	Summarize the use of thresholding as a segmentation technique in image analysis.	CO2	L2
3.	Apply Hough Transform for circle detection along with its working principle. How is Hough transform used for detecting lines?	CO2	L3
4.	Examine how principal component analysis is used to reduce dimensionality of a dataset with their variance preservation. Mention the pros and cons of PCA technique.	CO3	L4
5.a.	Evaluate the design cycle of a pattern recognition system.	CO3	L5
5.b.	Compare between various distance/similarity measures.	CO3	L5
6.	Discuss the working of Bayesian classifiers and Artificial Neural Networks (ANN) and how do they work in terms of accuracy, complexity, and scalability.	CO4	L6
7.a.	Identify the role of discriminant functions in classification problems of pattern recognition.	CO4	L3
7.b.	Utilize the concept of feature extraction to highlight the differences between spectral and spatial domain features using suitable examples.	CO4	L3
8.	Explain in detail the recent trends in activity recognition, computational photography, and biometric recognition.	CO5	L5

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M.Tech (CSE), Semester-2nd
HUMAN AND COMPUTER INTERACTION
Subject Code: 25CICSP-PE4-01/MTCS-209-18

M.Code: 76060 / 97883
Date of Examination: 14/05/2026

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Categorize the concept of Human-Computer Interaction (HCI) and its goals.	CO1	L4
2.a.	Explain the mobile eco system's layered architecture, with the help of structured diagram.	CO2	L2
2.b.	Illustrate Norman's Interaction Model (Seven Stages of Action) with examples.	CO2	L2
3.	Identify the role of stakeholder. Outline the types of stakeholders and appraise the stakeholders for a train booking system.	CO2	L3
4.	Differentiate application content and utility content. List different application framework used in mobile HCI.	CO3	L4
5.a.	Describe multimodal systems used in HCI. What role do they play in contemporary interfaces?	CO3	L5
5.b.	Explain Inlays and Virtual Pages. How do they enhance user experience?	CO3	L5
6.	Discuss the role of AI in speech recognition and translation technologies.	CO4	L6
7.a.	Identify Contextual Tools with diagram in HCI. Explain their importance with suitable examples.	CO4	L3
7.b.	Plan the case of preparing a group presentation for a software project. Mention the stages in specifying and designing UI for the same.	CO4	L3
8	Criticize the role of Natural Language Processing (NLP) in speech recognition and translation.	CO4	L5

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M.Tech (CSE), Semester-3rd
OPTIMIZATION TECHNIQUES

Subject Code: MTCS 304-18

M.Code: 76511

Date of Examination: 20/05/2026

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWELVE marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Apply optimization techniques to minimize production cost in a factory subject to labor and material constraints.	CO1	L3
2.a.	Outline the general steps followed in optimization algorithm. What are the various ways to check convergence?	CO2	L2
2.b.	Summarize the concept of a feasible region in optimization problems.	CO2	L2
3.	Examine the drawbacks of ignoring constraints in an optimization model with suitable examples. Analyze the role of constraints in an optimization model	CO2	L4
4.	Simplify the steps involved in solving a Linear Programming problem using the simplex method.	CO3	L4
5.a.	Evaluate the importance of mathematical programming in modern engineering design.	CO3	L5
5.b.	Explain the salient features of semi-definite programming and the formulation of the primal and dual semi definite programming problems.	CO3	L5
6.	Elaborate conceptual workflow illustrating the steps of Particle Swarm Optimization and explain how swarm intelligence guides the search toward the global optimum.	CO4	L6
7.a.	Simplify the functioning of the Genetic Algorithm with the help of pseudocode.	CO4	L4
7.b.	Analyze the lifecycle of an ant by applying the concept of Pheromones and their foraging behaviour.	CO4	L4
8	Discuss any two real life problems and their mathematical formulation. Determine any two recent applications of Linear Programming in industry (2024–25). For each, mention the problem solved.	CO5	L5

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