

AI & ML Algorithm (315330)

MSBTE Diploma · K-Scheme · Semester 5 (AI & ML — AN) · Important Questions — unit-wise

Based on MSBTE papers W-2025 and S-2026 (the only two papers of this K-scheme subject available on msbte.ac.in) and the official K-scheme syllabus. Practice guidance only — not a prediction of the exam.

Probability: High = asked in both papers (or 3+ times) · **Medium** = asked once · **Low** = in syllabus but not asked yet. With only two papers, these are trends, not certainties — study the full syllabus.

Unit	Title	Syllabus marks	Marks seen in papers (W-25 + S-26)
1	Basics of AI and Problem Solving Techniques	14	22 + 20
2	Knowledge and Reasoning	12	16 + 18
3	Introduction to ML	14	20 + 20
4	Types of Learning	14	16 + 22
5	Regression and Classification	16	28 + 22

Paper marks include optional questions (e.g. 7 questions printed in Q.1, any 5 to attempt), so they are higher than the syllabus marks.

Unit I — Basics of AI and Problem Solving Techniques (syllabus: 14 marks)

Question / topic	Marks	Asked in	Count	Probability
Applications of AI W-25 Q.1a: List any four application of AI. S-26 Q.1a: List any two applications of AI.	2	S-26, W-25	2	High
A* algorithm (working / properties) W-25 Q.2a: Describe properties of A algorithm. S-26 Q.3c: Explain A* algorithm in detail.	4	S-26, W-25	2	High
Heuristic search techniques — Greedy best-first etc. (with example) W-25 Q.4a: Explain Greedy Best-First technique with example. S-26 Q.2a: State and explain any two Heuristic Search Techniques with example.	4	S-26, W-25	2	High
Need / role of search algorithms in AI W-25 Q.1b: State the need of search algorithm in Artificial Intelligence.	2	W-25	1	Medium
Local search algorithm (hill climbing) with example W-25 Q.3a: Explain local search algorithm with example.	4	W-25	1	Medium
Breadth-First Search (BFS) with example S-26 Q.4c: Describe working of BFS in AI with example.	4	S-26	1	Medium
Intelligent agent — structure of agent and Turing test	6	W-25	1	Medium

W-25 Q.5a: Explain Intelligent agent in AI w.r.t. structure of agent and turing test in AI.				
Components of AI S-26 Q.6b: Describe various components in AI.	6	S-26	1	Medium
Types of agents (simple reflex, model-based, goal-based, utility-based, learning); rationality, PEAS / nature of environment	—	Not yet	0	Low
Depth-first search; generate-and-test; problem reduction; heuristic function	—	Not yet	0	Low
Beyond classical search: online search, nondeterministic actions, partial observation	—	Not yet	0	Low

Unit II — Knowledge and Reasoning (syllabus: 12 marks)

Question / topic	Marks	Asked in	Count	Probability
Knowledge-based agent — architecture / need / design approaches W-25 Q.4b: Describe the architecture of knowledge based agent in AI. S-26 Q.1f: Why knowledge-based Agents are used in AI ? S-26 Q.4b: Explain different Designing approaches for Knowledge-Based-Agents in AI.	2, 4	S-26, W-25	3	High
Probabilistic reasoning and Bayes' theorem (with example) W-25 Q.2b: Illustrate Bayes' Theorem with example. W-25 Q.5b: Illustrate probabilistic reasoning in AI with example. S-26 Q.3b: Explain need of probabilistic reasoning in AI, state Baye's Theorem.	4, 6	S-26, W-25	3	High
Reasoning — definition and types (with examples) S-26 Q.1b: Define Reasoning. S-26 Q.6c: List and explain various types of reasoning in AI with its example.	2, 6	S-26	2	Medium
Forward chaining vs backward chaining W-25 Q.1c: Compare forward chaining and backward chaining in AI.	2	W-25	1	Medium
Propositional logic and first-order logic; inference rules	—	Not yet	0	Low
Uncertainty in AI and its causes	—	Not yet	0	Low

Unit III — Introduction to ML (syllabus: 14 marks)

Question / topic	Marks	Asked in	Count	Probability
Machine Learning life cycle (draw / explain) W-25 Q.1d: Draw machine learning life cycle. S-26 Q.4a: Explain Machine Learning Life Cycle.	2, 4	S-26, W-25	2	High
Training dataset vs testing dataset (working, significance)	4, 6	S-26, W-25	2	High

W-25 Q.2c: Differentiate between Training dataset and Testing dataset. S-26 Q.5b: Explain working of Training and Testing data in ML with its significance.				
Data Analytics vs Data Science W-25 Q.3b: Differentiate between Data Analytics and Data Science. S-26 Q.1c: Differentiate between Data Analytics and Data Science (any two points).	2, 4	S-26, W-25	2	High
Different forms of data W-25 Q.6a: Explain different forms of data. S-26 Q.2b: Explain different forms of data. Also illustrate different data cleaning process in machine learning.	4, 6	S-26, W-25	2	High
Data cleaning (missing data, outliers) with example W-25 Q.4c: Elaborate data cleaning with example. S-26 Q.2b: (same question) ... illustrate different data cleaning process in machine learning.	4	S-26, W-25	2	High
AI vs ML S-26 Q.3a: Differentiate between AI and ML.	4	S-26	1	Medium
History and evolution of ML; data wrangling; statistics vs data mining	—	Not yet	0	Low

Unit IV — Types of Learning (syllabus: 14 marks)

Question / topic	Marks	Asked in	Count	Probability
Supervised vs unsupervised learning (six points) W-25 Q.6b: Differentiate between supervised and unsupervised learning (Minimum six points of each). S-26 Q.6a: Differentiate between Supervised and Unsupervised ML (Any 6 points).	6	S-26, W-25	2	High
Unsupervised learning — definition / types of algorithms W-25 Q.1e: Define unsupervised learning with example. S-26 Q.1d: List different types of unsupervised machine learning Algorithms.	2	S-26, W-25	2	High
Cross-validation; positive and negative class W-25 Q.2d: Explain positive and negative class cross-validation. S-26 Q.2c: Explain Cross-validation, Positive and Negative class with its significance.	4	S-26, W-25	2	High
K-means clustering (program / algorithm) S-26 Q.4e: Implement a program K-means clustering Algorithm.	4	S-26	1	Medium
Hierarchical clustering W-25 Q.4d: Explain Hierarchical clustering unsupervised learning algorithm.	4	W-25	1	Medium
Random forest algorithm (Python + features) S-26 Q.5a: Illustrate Random forest Algorithm in Python. State its features.	6	S-26	1	Medium
Semi-supervised learning	—	Not yet	0	Low

Decision tree (entropy, information gain); K-nearest neighbours; neural networks	—	Not yet	0	Low
Benefits of cross-validation (k-fold)	—	Not yet	0	Low

Unit V — Regression and Classification (syllabus: 16 marks)

Question / topic	Marks	Asked in	Count	Probability
Metrics for classification — confusion matrix, precision, recall, F1 W-25 Q.1f: List metrics for classification. S-26 Q.1e: State importance of confusion matrix. S-26 Q.1g: Define Term : F1 Score, Recall. S-26 Q.2d: List and explain different metrics for classification.	2, 4	S-26, W-25	4	High
Regression metrics — MSE, RMSE, MAE W-25 Q.5c: Explain the following metrics for Regression: MSE, RMSE, MAE. S-26 Q.5c: Explain the following Metrics for Regression: MSE, RMSE, MAE.	6	S-26, W-25	2	High
Multiple linear regression — implement (Python) W-25 Q.6c: Implement multiple linear regression with example. S-26 Q.3d: Implement Multiple Linear Regression in Python.	4, 6	S-26, W-25	2	High
Overfitting and underfitting W-25 Q.4e: Differentiate between overfitting and underfitting. S-26 Q.4d: Explain Overfitting and Underfitting issues in ML.	4	S-26, W-25	2	High
Linear regression — definition with example W-25 Q.1g: Define linear regression with example.	2	W-25	1	Medium
Logistic regression algorithm W-25 Q.3c: Describe logistic regression learning algorithm.	4	W-25	1	Medium
Binary and multiclass classification W-25 Q.3d: Explain Binary and Multiclass classification.	4	W-25	1	Medium
One-vs-One and One-vs-Rest strategies; ROC curve and AUC; accuracy and precision	—	Not yet	0	Low

Paper pattern (same in W-2025 and S-2026)

Q.	Attempt	Marks each	Total
1	Any FIVE of 7	2	10
2	Any THREE of 4	4	12
3	Any THREE of 4	4	12
4	Any THREE of 5	4	12
5	Any TWO of 3	6	12
6	Any TWO of 3	6	12
	3 Hours		70

Observation: both papers are mostly theory (explain / differentiate / list). Programs asked so far: multiple linear regression, K-means and random forest in Python. Practise small algorithm examples (A*, greedy best-first, BFS, Bayes' theorem, metrics) — "with example" questions are common.

Note: This is an **important-questions list prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in