D–1030	Sub. Code
	51811

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2025.

First Semester

FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What is meant by state space search?

2. Identify the characteristics of problem system.

3. What is Hill climbing in heuristic search?

4. Define Means-end analysis.

5. List out the different approaches to knowledge representations.

6. Mention two advantages of using frames for knowledge representation.

7. What is logic programming?

8. Give an example of computable function in AI.

9. Comment on rote learning.

10. Give an example of analogy-based learning.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) What is problem space? Explain its importance in AI.

Or

(b) Discuss the characteristics of problem systems in AI.

12. (a) Explain the generated-and-test heuristic technique with example.

Or

(b) Elaborate on constraint satisfaction problems and their applications in AI.

13. (a) Describe the major issues in knowledge representation.

Or

(b) Analyse the role of predicate logic in AI knowledge representation.

14. (a) Differentiate forward reasoning and backward reasoning.

Or

(b) Discuss the importance of control knowledge in AI.

15. (a) Demonstrate the concept of learning in AI with example.

Or

(b) Summarize the concept of discovery learning and its role in AI applications.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. What are production systems? Explain their components and characteristics.

17. Illustrate the significance of heuristic search techniques in AI.

18. Compare different methods of knowledge representation.

19. Elucidate on logic programming and discuss its role in AI problem – solving.

20. Differentiate inductive learning, explanation-based learning and analogy-based learning.

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D–1031	Sub. Code
	51812

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2025.

First Semester

RELATIONAL DATABASE MANAGEMENT SYSTEM (RDBMS)

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Differentiate between instance and schema in a database.

2. What is data abstraction? Mention its levels.

3. List any two advantages of ER modeling.

4. Define : Foreign key.

5. Write the SQL command to retrieve unique values from a column.

6. What is the use of the CHECK constraint in SQL?

7. Write any two set operations in relational algebra.

8. Define : Domain relational calculus.

9. Mention two key benefits of using RAID in DBMS.

10. What are the uses of hashing in databases?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the major components of a database system.

Or

(b) Discuss the role of a database administrator.

12. (a) Discuss the types of attributes in ER model with examples.

Or

(b) Explain the types of keys in relational model with examples.

13. (a) Give any five DML SQL commands with explanation.

Or

(b) Discuss subqueries in FROM clause with example.

14. (a) List and explain any five relational algebra operations.

Or

(b) Compare relational algebra vs relational calculus.

15. (a) Explain the functional dependency with examples.

Or

(b) Discuss ACID properties of transactions.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Draw and explain the ER diagram for the library system and convert it into a relational model.

17. Describe all the relational algebra operations in detail.

18. Elaborate on SQL constraints and integrity enforcement.

19. Explain the process of schema refinement and normalization to BCNF.

20. Explain the process of storage and indexing with B+ tree.

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D–1032	Sub. Code
	51813

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2025.

First Semester

R PROGRAMMING

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. List the features of R.

2. Define variables in R.

3. What is recursion?

4. Illustrate the use of vectors in R.

5. What is an array in R?

6. Write a short note about a data frame.

7. What is data reshaping in R?

8. Mention the function used to read XML files in R.

9. Highlight the use of the RMySQL package.

10. What is a scatterplot matrix?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) How do break and next statements alter loop execution? Give an example.

Or

(b) Discuss the various data types in R.

12. (a) Explain the rules of string declaration in R.

Or

(b) Create a vector of numeric values and perform addition and sorting operations.

13. (a) Examine how to use factors in R.

Or

(b) Elaborate on matrix operations such as addition, multiplication and transpose using R.

14. (a) Outline the process of installing and loading R packages.

Or

(b) Explore the structure of the melt and cast and frames.

15. (a) How do you manipulate database tables from R? Illustrate.

Or

(b) Write an essay on line graphs and trend visualization.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe in detail the different control structures available in R.

17. Elaborate on lists in R : creation, naming, accessing and manipulation with examples.

18. Compare data frames and lists with practical applications.

19. Write a comprehensive guide to importing and exporting data in R.

20. Write an R code to generate a pie chart with percentages and a legend.

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D–1033	Sub. Code
	51821

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2025.

Second Semester

FUNDAMENTALS OF MACHINE LEARNING

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define machine learning.

2. Differentiate between parametric and non-parametric methods.

3. What is cross-validation?

4. List any two real-word applications of ML.

5. What is a hypothesis test in ML?

6. Define rule-based classification.

7. What is Lazy learning in ML?

8. Mention any two types of clustering.

9. What is the role of reward in reinforcement learning?

10. List any two deep learning architectures.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the various types of machine learning approaches.

Or

(b) Describe the phases of data preprocessing with examples.

12. (a) Explain training, testing and validation phases in ML.

Or

(b) Write short notes on parametric and non-parametric models with examples.

13. (a) Explain decision tree algorithm with a sample decision node.

Or

(b) Describe the working of Naïve Bayes classification algorithm.

14. (a) Differentiate between partition and hierarchical clustering algorithms.

Or

(b) Explain any two distance measures used in clustering.

15. (a) Explain the working of Extreme Learning Machine (ELM).

Or

(b) Mention the features of Weka and TensorFlow software tools.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the Backpropagation algorithm with suitable example and diagram.

17. Compare support vector machines with k-Nearest Neighbor algorithm.

18. Describe Markov decision process and Monte Carlo prediction in reinforcement learning.

19. Write in detail about CNN architecture and its use in image classification.

20. Explain the architecture and training of Recurrent Neural Networks (RNN).

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D–1034	Sub. Code
	51822

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2025.

Second Semester

PRINCIPLES OF SOFT COMPUTING

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define soft computing.

2. Differentiate between hard computing and soft computing.

3. What is the basic architecture of artificial neural network?

4. List any two features o fuzzy sets.

5. Mention two membership value assignment methods.

6. What is the purpose of defuzzification?

7. List any two types of unsupervised neural networks.

8. Define : Fitness function in genetic algorithm.

9. What is the function of BAM?

10. What is the difference between ADALINE and MADALINE?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) List any five characteristics and applications of soft computing.

Or

(b) Discuss the types of learning in ANN.

12. (a) Explain the structure, functions and components of perceptron network.

Or

(b) Discuss the layers and activation functions of Radial Basis Function (RBF) Network with neat diagrams and example.

13. (a) Write a note on Kohonen Self-Organizing Map (SOM).

Or

(b) Explain the concept and structure of ART network.

14. (a) Compare the characteristics of Crisp vs Fuzzy set.

Or

(b) Explain the properties of fuzzy sets.

15. (a) Explain the genetic algorithm components and stages.

Or

(b) List the classification and applications of GA.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the ANN architecture, terminologies and applications.

17. Explain the architecture and components of backpropagation algorithm.

18. Elaborate on the fuzzy composition and relations.

19. Explain the fuzzy inference and control system in detail with examples.

20. Explain the genetic operators in detail with encoding example.

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D–1035	Sub. Code
	51823

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2025.

Second Semester

PYTHON PROGRAMMING

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Mention the features of Python.

2. What is the use of if-else in Python?

3. Distinguish between local and global variables.

4. What is the str class?

5. What are negative indices in lists?

6. Define : Tuple.

7. Name two set classes in Python.

8. How do you retrieve values from a dictionary?

9. How do you open a file for reading?

10. What is Scikit-learn used for?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Describe how the printf( ) function works in Python.

Or

(b) Elaborate on Python's data types and their usage.

12. (a) Explain how to define and use a function in Python.

Or

(b) Create a function to find the frequency of characters in a string.

13. (a) Describe the creation and initialization of a list.

Or

(b) Demonstrate tuple indexing and slicing.

14. (a) Discuss how to traverse dictionaries using loops.

Or

(b) Write a program that uses a nested dictionary to store student marks.

15. (a) Online the need for file handling and different file modes.

Or

(b) Write a Python program to use Sympy to solve a quadratic equation symbolically.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Differentiate between various types of loops in Python.

17. Discuss string manipulation techniques in Python.

18. Explain how to pass lists to functions and return from them.

19. Summarize set creation, operations and use cases in Python.

20. Write an essay on the use of scientific libraries like NumPy and SciPy.

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