D–6030	Sub. Code
	51811

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2024.

First Semester

FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. List any four applications of AI.

2. List the steps in generate and test algorithm.

3. State the need for uninformed search algorithm.

4. Write about two kinds of entities in knowledge representation.

5. List any four issues involve in AI knowledge representation.

6. Define first order predicate logic.

7. What is genetic learning?

8. What is the learning element in AI?

9. Compare supervised with unsupervised learning.

10. What is genetic learning?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) List the various problems solved by AI and discuss three main AI techniques.

Or

(b) Write a note problem, problem spaces and search.

12. (a) Discuss AO* algorithm in problem reduction.

Or

(b) With appropriate examples, explain how the problem is solved using mean end analysis.

13. (a) Sketch and explain mapping between facts and representations.

Or

(b) State the need for knowledge representation and list the knowledge representation properties.

14. (a) With example, explain three ways of representing class membership using ISA relationship.

Or

(b) Compare procedural knowledge with declarative knowledge.

15. (a) Sketch and explain general learning model.

Or

(b) Explain with illustration of learning in problem solving.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. With appropriate illustration, explain in detail about production system in AI.

17. With illustration explain best first search technique in AI.

18. With appropriate examples and diagram explain knowledge representation schemes in AI.

19. Explain in detail about resolution in AI.

20. With appropriate diagram, discuss about explanation-based learning in AI.

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D–6031

Sub. Code
51812

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2024.

First Semester

RELATIONAL DATABASE MANAGEMENT SYSTEM (RDBMS)

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define database management system.

2. List the various components involved in query processor with its purpose.

3. State the difference among a relationship instance, and a relationship set.

4. Define weak entity set with an example.

5. State the properties of relational model.

6. What is a foreign key in the relational model?

7. State the use of selection operation with an example.

8. State domain relational calculus with its notation.

9. Write the syntax of basic SQL query with expiation.

10. State the difference between select and select distinct with examples.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Compare database system with file system.

Or

(b) Illustrate and explain various ACID properties involved in transaction processing.

12. (a) With illustration explain in detail about the attributes and its types.

Or

(b) Discuss the conventions for displaying an ER schema as an ER diagram.

13. (a) Write a note on update on views with examples.

Or

(b) With illustration, explain referential integrity constraints.

14. (a) Write a note on the DML commands with examples.

Or

(b) Explain the logical connectives using SQL.

15. (a) Consider the following set of functional dependencies :

$F1 = \{AB \rightarrow C, DEG \rightarrow H, A \rightarrow C, DE \rightarrow G\}$.

Transform the set F1 into a new set of fd's F1, in which each fd is left reduced (i.e. has no redundant attributes on its left hand side).

Or

(b) Write a note on BCNG.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Write a detailed note on view of data and various data models.

17. Consider a MOVIE database in which data is recorded about the movie has a length in minutes. Each has a production company, and each is classified under one or more genres (such as horror, action, drama, and so forth). Each movie has one or more directors, and one or more actors appear in it. Each movie also has a plot outline. Finally, each movie has zero or more quotable quotes, each of which is spoken by a particular actor appearing in the movie.

(a) Actors are identified by name and date of birth and appear in one or more movies. Each actor has a role in the movie.

(b) Directors are also identified by name and date of birth and direct one or more movies. It is possible for a director to act in a movie (including one that he or she may also direct).

(c) Production companies are identified by name, and each has an address. A production company produces one or more movies.

Design an entity-relationship diagram for the movie database.

18. Consider the schema :

employee(employee-name, street, city)

works(employee-name, company-name, salary)

company(company-name, city)

manages(employee-name, manager-name)

Give an SQL DDL definition for the tables of this database. Identify referential integrity constraints that should hold and include them in the DDL definition.

19. Consider the below relations and answer the queries using relational algebra.

Sid	Sname	Rating	Age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

An instance S3 of sailors

Sid	Bid	Day
22	101	10/10/98
22	102	10/10/98
22	103	10/8/98
22	104	10/7/98
31	102	11/10/98
31	103	11/6/98
31	104	11/12/98
64	101	9/5/98
64	102	9/8/98
74	103	9/8/98

An instance R2 of reserves

Bid	Bname	Color
101	Interlak	Blue
102	Interlak	Red
103	Clipper	Green
104	Marine	Red

(a) Find the names of sailors who have reserved boat 103

(b) Find the names of sailors who have reserved a red boat

(c) Find the colors of boats reserved by Lubber

(d) Find the names of sailors who have reserved at least one boat

(e) Find the names of sailors who have reserved a red or a green boat.

20. Considering the relation R(A, B, C, D, E) and the following functional dependencies, answer the questions.

FD1 : AB $\rightarrow$ C FD2 : CD $\rightarrow$ E FD3 : DE $\rightarrow$ B

(a) List all the candidate keys

(b) What is the highest normal form that R satisfies and why?

(c) If R is not already at least in 3NF, then normalize R into 3NF and show the resulting relation(s) and their candidate keys You decomposition should be both join-lossless and dependency-preserving. If R is already in 3NF, just list the candidate keys of R.

(d) Is your decomposition in BCNF as well? [yes/no]. Explain

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D–6032	Sub. Code
	51813

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2024.

First Semester

R PROGRAMMING

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. What components are essential for setting up the R environment?

2. How do you assign variables in R?

3. What are loop control statements?

4. Define the term recursion.

5. Create a script that converts a list of numbers into a vector and calculates the mean and median.

6. Implement a function that merges two lists in R, combining their elements into a single list.

7. What are matrices in R?

8. State the functions of melting and casting in R data reshaping.

9. What are binary files, and how do you read and write them in R?

10. What are the necessary steps to work with excel files in R?

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Describe the features of R that make it popular among statisticians, data analysts, and researchers.

Or

(b) Describe the significance of operators in R programming and categorize them based on their functionality.

12. (a) Explain the structure and functionality of if statements, highlighting their use in making decisions based on conditions.

Or

(b) Compare and contrast built-in functions with user-defined functions, highlighting their respective advantages and use case.

13. (a) Discuss methods for accessing and manipulating elements within lists in R.

Or

(b) Discuss common operations for manipulating vectors in R.

14. (a) Describe common operations performed on matrices in R and discuss their practical applications in data analysis.

Or

(b) Assess the impact of R packages on the usability and extensibility of the R programming language, and discuss strategies for selecting and managing packages in R projects.

15. (a) Discuss how to input and read XML files in R, including package installation and parsing techniques.

Or

(b) Explain the process of connecting R to a MySQL database, including package installation and database connection setup.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Explore the various data types and expressions commonly used in R programming and their practical applications.

17. Explore different string manipulation techniques and highlight their practical applications.

18. What are arrays? How to access and manipulate array elements? Elucidate the different array operations.

19. How to create data frames? Explore the structure of a data frame and different methods used for extracting data from a data frame in R.

20. Discuss the different types of charts and graphs available in R and explain their respective use cases and customization options.

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D–6033

Sub. Code
51821

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2024.

Second Semester

FUNDAMENTALS OF MACHINE LEARNING

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. Define machine learning.

2. What is data preprocessing?

3. What is the purpose of the training phase in machine learning?

4. Write a short note on the parametric method in machine learning.

5. Define supervised learning.

6. What is case-based reasoning?

7. Specify the importance of distance measures in clustering.

8. What is a partition algorithm in clustering?

9. What is the primary function of Weka in machine learning?

10. Define deep belief network.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Compare and contrast machine learning and artificial intelligence.

Or

(b) Explain the significance of feature selection in machine learning and how it impacts model performance.

12. (a) Explain the statistical learning framework and its components.

Or

(b) Describe how cross-validation can mitigate over fitting in machine learning models.

13. (a) Describe the decision tree classification algorithm and its primary components.

Or

(b) Describe the functioning of support vector machines (SVMs) and their application in classification problems.

14. (a) Explain the concept of unsupervised learning and how it differs from supervised learning.

Or

(b) Elucidate the main characteristics and steps involved in hierarchical clustering.

15. (a) Describe how auto-encoders function and their role in unsupervised learning.

Or

(b) Discuss the role of restricted Boltzmann Machines (RBMs) in building deep learning models.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Evaluate a real-world application of machine learning in a specific industry. Discuss the problem it addresses, the machine learning techniques used, and the outcomes achieved.

17. Analyze the flexibility of non-parametric methods in handling various types of data and learning tasks.

18. Describe the structure and functioning of a neural network used for classification.

19. Discuss density-based clustering methods in detail.

20. Discuss the principle of Monte Carlo prediction in reinforcement learning and its applications.

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D–6034	Sub. Code
	51822

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2024.

Second Semester

PRINCIPLES OF SOFT COMPUTING

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL the questions.

1. What is soft computing?

2. What is the learning process in neural networks?

3. Define perceptron network.

4. What is associative memory in neural networks?

5. Specify the basic concept of fuzzy sets.

6. Define fuzzy equivalence relation.

7. What is a fuzzy proposition?

8. Define the aggregation of fuzzy rules.

9. Define the concept of encoding in GA.

10. Give an example of an application of genetic algorithms.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Discuss the role of soft computing in solving complex real-world problems.

Or

(b) Discuss the scope of applications where ANNs are typically used.

12. (a) Discuss the Madaline network and its architecture.

Or

(b) Discuss the Boltzmann machine and its role in neural networks.

13. (a) Discuss the concept and applications of ART networks.

Or

(b) Explain the fuzzy composition and provide an example of its use.

14. (a) Describe the extension principle in fuzzy logic and its applications.

Or

(b) Analyze the role of fuzzy inference in expert systems.

15. (a) Explain the fundamental concept of genetic algorithms.

Or

(b) Discuss the role and importance of the fitness function in genetic algorithm.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Analyze the architecture of neural networks in detail.

17. Explain the back propagation algorithm and its significance in training neural networks.

18. Describe the structure and function of a counter propagation network.

19. Discuss the design and implementation of fuzzy logic control systems.

20. Describe genetic operators used in genetic algorithms and explain their functions.

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D–6035	Sub. Code
	51823

DISTANCE EDUCATION

DIPLOMA IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING EXAMINATION, DECEMBER 2024.

Second Semester

PYTHON PROGRAMMING

(CBCS 2021 Calendar Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. State the use of identifier and mention its rules with example.

2. State the use of 'and' operator with example.

3. What will be the output of the following code fragment assuming num is 10?

```
num=10
if num==20;
print('Apple')
print('Grapes')
print('No Output')
```

4. Mention the character to insert a new line in a string with example.

5. Create a list using constructor with three string elements, such as “Apple”, “Banana” and “Grapes”.

6. What is the output of the following statements :

   t1=(“APPLE”)

   (a) lent(t1)

   (b) t1.index(‘A’)

7. “A set is mutable”. Do you agree with this statement? Justify your answer.

8. State the purpose of dictionary in python with examples.

9. What is scikit-learn used for? List the functions of scikit-learn.

10. State the use of seek( ) function in python with example.

SECTION B — ($5 \times 5 = 25$ marks)

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

11. (a) Write a program to find the sum of the digits of a given number.

Or

(b) What will be the output of the following program?

```
count = 0
for x in range (1, 3):
    for y in range (4, 6):
        count = count + (x*y)
print (count)
```

12. (a) Write a function reverse_number( ) to return the reverse of the number entered.

Example: Reverse_number(1234) displays 4321

Or

(b) With examples, write a note on (i) substring and (ii) string comparison.

13. (a) Explain list slicing and list slicing with step size with appropriate examples.

Or

(b) Write a program to traverse tuples from a list.

14. (a) Write a note on various set operations with its syntax and examples.

Or

(b) Write a program to print and store squares of numbers into a dictionary.

15. (a) What is the use of file handing in python? With appropriate syntax and example, explain four file handling functions in python.

Or

(b) Explain in detail about various mathematical computing function associated with Numpy.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Write a python program to read a number through keyboard and calculate the sum of the digits.

17. With illustration, write a note on (a) nested if statement and (b) break and continue statement.

18. Write a python program to check whether given string is palindrome or not.

19. With syntax and examples explain in detail about various operators in list.

20. Explain in detail about various methods in visualizing data using matplotlib.

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