

DIPLOMA IN ARTIFICIAL INTELLIGENCE (1st Semester)

ASSIGNMENTS



**Centre for Distance and Online Education
Guru Jambheshwar University of Science
& Technology, Hisar – 125001
(2026-2027)**

CENTRE FOR DISTANCE AND ONLINE EDUCATION
GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

Course: Mathematics
Paper Code: DAI-11-T

Semester: 1st
Max. Marks: 30

Important Instructions:

- 1) Attempt all questions from each assignment given below.
- 2) Each assignment carries 15 marks.
- 3) All questions are to be attempted in legible handwriting on plane white A-4 size paper and same is uploaded through login your account.

ASSIGNMENT - 1

Q1. Reduce the matrix

$$A = \begin{pmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{pmatrix}$$

to echelon form and hence find its rank.

Q2. Find the eigen values and the corresponding eigen vectors of the matrix

$$A = \begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$$

Q3. Reduce the quadratic form

$$Q = x_1^2 + 2x_2^2 + x_3^2 - 2x_1x_2 + 2x_2x_3$$

to canonical form using an orthogonal transformation. Also determine its rank, signature, and index.

ASSIGNMENT - 2

Q1. State and verify Lagrange's Mean Value Theorem for the function

$$f(x) = x^3 - 5x^2 - 3x \quad \text{on } [1, 3]$$

Q2. Using Lagrange's method of multipliers, find the maximum value of

$$f(x, y, z) = xyz \quad \text{subject to } x + y + z = 3a$$

Q3. Evaluate the double integral

$$\int_0^1 \int_0^{\sqrt{1-x^2}} (x^2 + y^2) dy dx$$

by changing it into polar coordinates.

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Course: Probability and Statistics
Paper Code: DAI-12-T

Semester: 1st
Max. Marks: 30

Important Instructions:

- 1) Attempt all questions from each assignment given below.
- 2) Each assignment carries 15 marks.
- 3) All questions are to be attempted in legible handwriting on plane white A-4 size paper and same is uploaded through login your account.

ASSIGNMENT - 1

Q1. State Baye's theorem. A factory has three machines M_1 , M_2 , M_3 producing 25%, 35% and 40% of the total output respectively. The percentage of defective items produced by them is 5%, 4% and 2% respectively. An item is chosen at random and found defective. Find the probability that it was produced by machine M_3 . **[5]**

Q2. A discrete random variable X has the probability mass function

$$P(X = x) = k(x + 1), \quad x = 0, 1, 2, 3, 4$$

where k is a constant. Find the value of k , and hence obtain $P(X \leq 2)$ and $E(X)$. **[5]**

Q3. In a binomial distribution, the mean is 4 and the variance is 3. Find the parameters n and p of the distribution, and hence find $P(X = 2)$. **[5]**

ASSIGNMENT - 2

Q4. Explain the difference between point estimation and interval estimation. A random sample of size 100 has a mean of 65 with a population standard deviation of 8. Construct a 95% confidence interval for the population mean. **[5]**

Q5. A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38 at the 5% level of significance. **[5]**

Q6. Explain the Chi-square test for goodness of fit. In an experiment on pea breeding, the observed frequencies of four phenotypes were 315, 108, 101 and 32, while the theoretical (expected) frequencies according to Mendelian ratio

$$9 : 3 : 3 : 1$$

were 312.75, 104.25, 104.25 and 34.75. Test the goodness of fit at the 5% level of significance **[5]**

$$\chi_{0.05, 3}^2 = 7.815$$

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Subject: Data Structure
Code: DAI-13-T

Semester: 1st Sem
Max. Marks: 30

Important Instructions:

- 1) Attempt all Questions each assignment given below
- 2) Each assignment carries 15 marks
- 3) All questions are to be attempted in legible handwriting on plane white A-4 size paper and upload the scanned copy of the assignments on student's portal

ASSIGNMENT – I

- Q1. Describe Data Structure. Classify data structures into linear and non-linear categories and explain their major operations with suitable examples.
- Q2. Explain the concept of a Stack and its basic operations. Describe how a stack can be used to solve a practical problem, with a suitable example.
- Q3. Define a Queue and explain the concept of a Circular Queue. Describe its working, insertion and deletion operations.

ASSIGNMENT – II

- Q1. Explain the concept of a Binary Tree. Describe pre-order, in-order and post-order traversals with a suitable example.
- Q2. What is a Heap Data Structure? Explain the construction and working of Max-Heap and Min-Heap with suitable examples.
- Q3. Explain graph traversal techniques DFS and BFS. Describe their working with a suitable example and compare their time and space requirements.

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**CENTRE FOR DISTANCE AND ONLINE EDUCATION
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**Nomenclature: Introduction to Artificial Intelligence
Code: DAI-14-T**

**Semester: 1st
Total Marks: 30**

Note: Important Instructions for Assignments.

- Attempt **all questions** from the both assignments. Each question carries equal marks.
- **Typed and Xerox Copies of Assignments will not be accepted in any case.**
- All questions are to be attempted in **legible handwriting and written** on plane white A-4 size paper.
- The student needs to scan all pages of handwritten assignment in **PDF format**.

Assignment –I

Q.1 What is Artificial Intelligence? Explain its major applications in daily life with suitable examples.

Q.2 What is a state space in Artificial Intelligence? Explain the basic steps involved in solving a problem using state space search.

Q.3 What is Knowledge Representation? Explain different methods of representing knowledge in Artificial Intelligence.

Assignment – II

Q.1 What is a Bayesian Belief Network? Explain its basic components with a simple example.

Q.2 What is heuristic search? Explain the Best First Search algorithm in simple terms with its advantages and limitations.

Q.3 What is Hill Climbing algorithm? Explain its working with a suitable example. Also discuss its main problems.

Prepared By:

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**CENTRE FOR DISTANCE AND ONLINE EDUCATION
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Course Name: Python Programming
Paper Code: DAI-15-T

Semester:1st
Max. Marks: 30

Important Instructions:

- 1) Attempt all questions from each assignment given below.
- 2) Each assignment carries 15 marks.
- 3) All questions are to be attempted in legible handwriting on plane white A-4 size paper and same is uploaded through login your account.

ASSIGNMENT-I

- Q1. Discuss the history, features, advantages, and applications of Python. Also explain Python identifiers, character set, keywords, indentation, and comments.
- Q2. Explain Python data types and variables in detail. Also explain the concept of namespaces.
- Q3. Explain loop control statements with suitable examples.

ASSIGNMENT-2

- Q1. What is a function in Python? Explain built-in functions, user-defined functions, the main function, defining and calling functions, and the importance of functions in modular programming.
- Q2. What do you mean by parameter passing? Explain their use with suitable examples.
- Q3. Explain inheritance and polymorphism in Python. Also explain how these concepts support code reusability.

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CENTRE FOR DISTANCE AND ONLINE EDUCATION
GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

Course Name: Data Structures Lab
Code: DAI-16-P

Semester: 1st
Max. Marks: 30

Important Instructions

1. Attempt any ten experiments/assignments.
2. All assignments are to be completed either in legible handwriting on plain white A4-size paper or typed in a Word file, along with appropriate screenshots of the output of the respective assignments. Practical file must be uploaded on the LMS portal.

List of experiments/assignments:

- Q1. Perform Linear Search and Binary Search on an array.
 - a. Read an array of type integer.
 - b. Input element from user for searching.
 - c. Search the element by passing the array to a function and then returning the position of the element from the function, else return -1 if the element is not found.
 - d. Display the position where the element has been found.
- Q2. Implement sparse matrix using array. Description of program:
 - a. Read a 2D array from the user.
 - b. Store it in the sparse matrix form, use array of structures.
 - c. Print the final array.
- Q3. Create a linked list with nodes having information about a student and perform:
 - a. Insert a new node at specified position.
 - b. Delete a node with the roll number of student specified.
 - c. Reversal of that linked list.
- Q4. Create doubly linked list with nodes having information about an employee and perform:
- Q5. Insertion at front of doubly linked list.
- Q6. Deletion at end of that doubly linked list.
- Q7. Create circular linked list having information about a college and perform:
- Q8. Insertion at front.
- Q9. Deletion at end.
- Q10. Create a stack and perform Pop, Push, Traverse operations on the stack using Linear Linked List.
- Q11. Create a Linear Queue using Linked List and implement different operations such as Insert, Delete, and Display the queue elements.
- Q12. Create a Binary Tree (Display using Graphics), perform Tree traversals (Preorder, Postorder, Inorder) using the concept of recursion.
- Q13. Implement insertion, deletion and display (inorder, preorder and postorder) on binary search tree.
- Q14. To implement Quick sort, and Bubble sort using array as a data structure.

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Course Name: Data Analysis using Excel Lab
Code: DAI-17-P

Semester: 1st
Max. Marks: 30

Important Instructions

1. Attempt these experiments/assignments.

All assignments are to be completed either in legible handwriting on plain white A4-size paper or typed in a Word file, along with appropriate screenshots of the output of the respective assignments. Practical file must be uploaded on the LMS portal

Experiment: 1

- a. Study functions and features of Microsoft Excel
- b. Getting started with excel: Opening a blank or new workbook, general organization
- c. Highlights and main functions: Home, Insert, page layout, formulas
- d. Highlights and main functions: Data, review, view, add-ins

Experiment: 2

- a. Customizing the Quick Access Toolbar,
- b. Working with Data: Entering, Editing, Copy, Cut, Paste, Paste Special

Experiment: 3

- a. Manipulating Data, using Data Names and Ranges, Filters and Sort and Validation Lists
- b. Data from External Sources
- c. Basic Formulas and Use of Functions
- d. Data Analysis Using Charts and Graphs

Experiment: 4

- a. Advanced Formulas and Functions, Advanced Worksheet Features

Experiment: 5

- a. Advanced Data Analysis using PivotTables and Pivot Charts

Experiment: 6

- b. Tabulation

- c. Bar diagram
- d. Multiple Bar diagram
- e. Pie diagram

Experiment: 7

Measure of central tendency: Mean, median, mode

Experiment: 8

- a. Measure of dispersion: variance, standard deviation, Coefficient of variation
- b. Correlation, regression lines

Experiment: 9

Measure of dispersion: variance, standard deviation, Coefficient of variation

Correlation, regression lines

t-test, F-test

Experiment: 10

ANOVA one way classification

Experiment: 11

t-test, F-test, ANOVA one way classification, chi square test, independence of attribut

Experiment: 12

Chi square test, independence of attributes

Experiment: 13

Time series: forecasting Method of least squares

Experiment: 14

Moving average method, Inference and discussion of results

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CENTRE FOR DISTANCE AND ONLINE EDUCATION
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Course Name: Python Programming Lab.
Code: DAI-18-P

Semester: 2nd
Max. Marks: 30

Important Instructions

1. Attempt any **Eight** experiments/assignments.
2. All assignments are to be completed either in legible handwriting on plain white A4-size paper or typed in a Word file, along with appropriate screenshots of the output of the respective assignments. Practical file must be uploaded on the LMS portal.

List of experiments/assignments:

1. Install Python and explore various popular IDE like IDLE, PyCharm, and Anaconda.
2. Assignments to perform various number operations like
 - a. Find maximum from a list of numbers
 - b. GCD of two number
 - c. Square root of a number
 - d. Check number is prime or not.
 - e. Print first N prime numbers
 - f. Remove duplicate numbers from list
 - g. Print the Fibonacci series.
3. Assignments to perform various operations on Strings like creation, deletion, concatenation.
4. Create a List L = [10, 20, 30]. Write programs to perform following operations:
 - a. Insert new numbers to list L.
 - b. Delete numbers from list L.
 - c. Sum all numbers in list L.
 - d. Sum all prime numbers in list L.
 - e. Delete the list L.
5. Create a Dictionary D= {'Name': 'Rakesh', 'Age': 27, 5:123456}.
Write programs to perform following operations:

- a. Insert new entry in D.
 - b. Delete an entry from D.
 - c. Check whether a key present in D.
 - d. Update the value of a key.
 - e. Clear dictionary D.
6. Two assignments on Sets to perform various operation like union, intersection, difference etc.
 7. Two assignments related to searching operation like linear search, binary search.
 8. Three assignments related to sorting like selection sort, bubble sort, insertion sort.
 9. Demonstrate the use of dictionary for measuring student marks in five subjects and find the student having maximum and minimum average marks.
 10. Two assignments on usage of different available packages like random package toper form
 - a. Print N random numbers ranging from 100 to 500.
 - b. Print 10 random strings whose length between 3 and 5.
 11. Two assignments on usage of package such as NumPy, Pandas.
 12. Implement and demonstrate the functions of a simple calculator.
 13. One assignment on implementing object-oriented concept such as classes, inheritance, and polymorphism.
 14. One assignment on file handling that how data is read and written to a file.