

DIPLOMA IN DATA SCIENCE

ASSIGNMENTS

DDS – 1st SEMESTER



(SESSION 2026-2027)

**Centre for Distance and Online Education
Guru Jambheshwar University of Science
& Technology, Hisar - 125001**

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

Programme: Diploma in Data Science

Course: Mathematics
Paper Code: DDS-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. (Unit I – Matrices)

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. (Unit II – Eigen Values and Eigen Vectors)

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. (Unit II – Quadratic Forms)

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

Q4. (Unit III – Mean Value Theorems)

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

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

Q5. (Unit III – Maxima and Minima)

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

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

Q6. (Unit IV – Multiple Integrals)

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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HISAR
Programme: Diploma in Data Science

Course: Probability and Statistics
Paper Code: DDS-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

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

[5]

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Programme: Diploma in Data Science

Nomenclature: Data Structure

Semester: 1st

Code: DDS-13-T

Total 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

Q.1 Define a Data Structure. Classify data structures into linear and non-linear categories and explain their major operations with suitable examples.

Q.2 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.

Q.3 Define a Queue and explain the concept of a Circular Queue. Describe its working, insertion and deletion operations, and state its advantages over a linear queue.

Assignment – II

Q.1 Explain the concept of a Binary Tree. Describe pre-order, in-order and post-order traversals with a suitable example and state their applications.

Q.2 What is a Heap Data Structure? Explain the construction and working of Max-Heap and Min-Heap with suitable examples.

Q.3 Explain graph traversal techniques DFS and BFS. Describe their working with a suitable example and compare their time and space requirements.

Prepared By:

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CDOE, GJUS&T, Hisar

CENTRE FOR DISTANCE AND ONLINE EDUCATION
GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY,
HISAR
Programme: Diploma in Data Science

Course: Introduction to Data Science
Paper Code: DDS-14-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 evolution from data-to-data science, the growth of data, and the major issues and challenges associated with rapidly growing data.
- Q2. Discuss the techniques of data selection, data integration, data transformation, and data reduction.
- Q3. Explain the various specific types of data used in data science, their characteristics, and their applications.

ASSIGNMENT-2

- Q1. What is Data Wrangling? Explain the process of combining and merging datasets. Discuss different approaches to merging data and explain their importance in data analysis.
- Q2. Discuss GroupBy mechanics, data aggregation, group-wise operations, transformations, pivot tables, and cross-tabulations. Explain how these techniques are useful for data analysis.
- Q3. Discuss histograms, scatter plots, time-series plots, graphs, and 3D visualization. Explain how appropriate visualization helps in understanding and communicating data.

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Paper: R Programming
Paper Code: DDS-15-T

Semester: 1st
Max. Marks: 30

Important Instructions:

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

ASSIGNMENT-1

- Q1. Explain the basic concepts of R programming. Also explain the use of RStudio, R command prompt, R script files, comments, and packages in R.
- Q2. Explain the different data types and data structures in R.
- Q3. Discuss variable assignment, finding and deleting variables, and explain arithmetic, relational, logical, assignment, and miscellaneous operators with examples.

ASSIGNMENT-2

- Q1. Explain decision-making and looping statements in R.
- Q2. Explain the syntax for defining and calling user-defined functions. Discuss built-in functions such as mean(), sum(), min(), max(), seq(), and paste().
- Q3. Explain data handling and visualization in R.

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CENTRE FOR DISTANCE AND ONLINE EDUCATION
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Course Name: Data Structures Lab.
Code: DDS-16-P

Semester: 1st
Max. Marks: 30

Important Instructions

1. Attempt any **Seven** 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. 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.
2. 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.
3. Create a linked list with nodes having information about a student and perform
 - a. Insert a new node at specified position.
 - b. Delete of a node with the roll number of student specified.
 - c. Reversal of that linked list.
4. Create doubly linked list with nodes having information about an employee and perform Insertion at front of doubly linked list and perform deletion at end of that doubly linked list.
5. Create circular linked list having information about an college and perform Insertion at front perform Deletion at end.
6. Create a stack and perform Pop, Push, Traverse operations on the stack using Linear Linked list.
7. Create a Linear Queue using Linked List and implement different operations such as Insert,

Delete, and Display the queue elements.

8. Create a Binary Tree (Display using Graphics) perform Tree traversals (Preorder, Postorder, Inorder) using the concept of recursion.
9. Implement insertion, deletion and display (inorder, preorder and postorder) on binary search tree.
10. To implement Merge sort, Quick sort, and Bubble sort using array as a data structure.

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

Semester: 1st
Max. Marks: 30

Important Instructions

1. Attempt any **seven** experiments/assignments.
1. 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

Advanced Formulas and Functions, Advanced Worksheet Features

Experiment: 5

Advanced Data Analysis using PivotTables and Pivot Charts

Experiment: 6

- a. Tabulation
- b. Bar diagram
- c. Multiple Bar diagram
- d. 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

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 attributes.

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: R Programming Lab
Code: DDS-18-P

Semester: 1st
Max. Marks: 30

Important Instructions

1. Attempt any **ten** experiments/assignments.
1. 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. Introduction to R and RStudio:
 - a. Install R and RStudio.
 - b. Explore RStudio interface, command prompt, script files, and comments.
- Q2. Handling Packages in R:
 - a. Install and load packages.
 - b. Use commands: `installed.packages()`, `packageDescription()`, `help()`, `find.package()`, `library()`.
- Q3. Input and Output Operations:
 - a. Enter data from the keyboard.
 - b. Print fewer or more digits.
 - c. Use special value functions: `NA`, `Inf`, `-Inf`.
- Q4. R Data Types:
 - a. Work with vectors, lists, matrices, arrays, factors, and data frames.
 - b. Variable Management in R:
 - c. Variable assignment and type identification.
 - d. Use `ls()` to list variables and `rm()` to delete variables.
- Q5. R Operators:
 - a. Perform operations with arithmetic, relational, logical, assignment, and miscellaneous operators.
- Q6. Decision Making in R:
 - a. Implement `if`, `if-else`, `if-else if`, and `switch` statements.
- Q7. Looping Constructs in R:
 - a. Use `repeat`, `while`, and `for` loops.
 - b. Control loops with `break` and `next` statements.
- Q8. Functions in R:
 - a. Define and call built-in and user-defined functions.
 - b. Experiment with functions: `mean()`, `paste()`, `sum()`, `min()`, `max()`, `seq()`.
- Q9. String Manipulations:
 - a. Use `substr()`, `strsplit()`, `paste()`, `grep()`, `toupper()`, `tolower()`.
- Q10. Vector Operations:
 - a. Create and manipulate vectors.
 - b. Perform vector math, sorting, and recycling.
- Q11. List Operations:
 - a. Create, access, and modify lists.

- b. Merge lists and convert lists to vectors.
- Q12. Matrix Operations:
- a. Access matrix elements.
 - b. Perform addition, subtraction, multiplication, and division.