

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.

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

CENTRE FOR DISTANCE AND ONLINE EDUCATION
GURU JAMBHESWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR
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:

Dr. Ritu
Assistant Professor (CS)
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.

Prepared By:
Dr. Neeraj Verma
Assistant Professor (CS)
CDOE, GJUS&T, Hisar

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

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.

Prepared By:

Dr. Kapila Devi
Assistant Professor (CS)
CDOE, GJUS&T, Hisar