

GURU JAMBHESWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR Centre  
for distance and online education Programme: Diploma in Data Science

Nomenclature: **Mathematics**  
DDS-11-T  
3+0+0

Semester: 1st Code:  
Total Marks: 30 Credits:

**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. Determine the rank of matrix  $A = \begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$  by reducing it to normal form.

Q2. Show that the equations  $3x + 3y + 2z = 1$ ,  $x + 2y = 4$ ,  $10y + 3z = -2$ ,  $2x - 3y - z = 5$  are consistent and hence obtain the solutions for  $x$ ,  $y$  and  $z$ .

Q3. Find  $c$  of Lagrange's mean value theorem for the following function  
 $x(x-1)(x-2)$  in  $\left[0, \frac{1}{2}\right]$

Assignment - II

Q1 Evaluate  $\iint_R xy \, dx \, dy$  over the positive quadrant of the circle  $x^2 + y^2 = a^2$ .

Q2. Verify Cayley-Hamilton theorem for the following matrix and hence find their inverse

$$\begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$$

Q3. Examine  $f(x, y) = x^3 + y^3 - 12x - 3y + 20$  for its extreme values.



GURU JAMBHESWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR  
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Nomenclature: **Probability and Statistics**  
Code: DDS-12-T  
Credits: 3+0+0

Semester: 1st  
Total Marks: 30

**Important Instructions:**

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- 2) Each assignment carries 15 marks
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Assignment – I

- Q1. Define sample space, experiment, independent events, favorable events and complementary events.
- Q2. Define probability mass function and probability density function with example.
- Q3. Explain Normal distribution with its properties.

Assignment - II

- Q1. Define probability, type I and type II error, one tail and two tail test.
- Q2. Describe one sample test for mean.
- Q3. Explain poisson distribution with its properties.



GURU JAMBHESWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR  
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Nomenclature: **Data Structure**

Semester: 1st

Code: DDS-13-T  
Credits: 3+0+0

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 what is Data Structure? Explain different types of Data Structure with examples. Also describe data structure operations.
- Q.2 what do you understand by stack? Explain the advantages and disadvantages of stack, and provide examples of operations (such as push, pop,) in each implementation. Also discuss how stacks can be used to transform an infix expression to postfix notation and evaluate arithmetic expressions.
- Q.3 what do you mean by Queue? Describe different types of queues, including linear queues, circular queues, de-queues, and priority queues. Highlight their structures, operations, and use cases in real-world scenarios

**Assignment - II**

- Q.1 Define Binary Search Trees. Discuss the primary operations, and provide examples to demonstrate these operations. Highlight the advantages and limitations of using BSTs in various applications.
- Q.2 Define graphs and explain key terminology. Discuss the memory representations of graphs. Explain Depth-First Search (DFS) and Breadth-First Search (BFS), providing examples to illustrate their applications.
- Q.3 (a) Explain the algorithms for Bubble Sort, Selection Sort, and Insertion Sort.  
(b) Explain the concepts of Quick Sort, Merge Sort, and Heap Sort.



GURU JAMBHESWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR  
Centre for distance and online education Programme: Diploma in Data Science

Nomenclature: **Introduction to Data Science**  
Code: DDS-14-T  
Credits: 3+0+0

Semester: 1st  
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 (a) what is data science? Explain the history and evolution of Data Science.  
(b) Explain the importance of data in decision-making and the interdisciplinary nature of data science in solving complex problems.
- Q.2 (a) Explain the impact of data science on the field healthcare, education, and technology.  
(b) Highlight the challenges associated with data privacy and ethical considerations in handling data.
- Q.3 (a) Describe the primary and secondary methods of data collection, Discuss the different types of data (structured, unstructured, semi-structured) and their measurement scales.  
(b) Explain the various types of datasets (such as multimedia, social media, biological, and sensor data).

**Assignment - II**

- Q.1 Explain the components of the data science methodology and describe how each component contributes to solving a data-driven problem.
- Q.2 Discuss the different phases of the data science life cycle
- Q.3 (a) Explain the objectives of exploratory data analysis (EDA) and discuss how common techniques, help achieve these objectives.  
(b) Discuss the role of data visualization in exploratory data analysis (EDA).



**Important Instructions:**

- 1) Attempt all Questions each assignment given below
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- 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 (a) Describe the programming language R. Discuss the advantages of R over other programming languages.
- (b) Explain the key features of R Studio, including the R command prompt, R script files, and how comments are used in R programming.
- Q.2 (a) Explain the various data types in R. Also, describe the different types of operators in R, such as arithmetic, relational, logical, and assignment operators, with examples of each.
- (b) Explain the different decision-making statements in R, Also Discuss the various types of loops in R.
- Q.3 (a) Describe R functions. Illustrate how functions can be defined, called with and without arguments.
- (b) Explain common string manipulation functions in R, such as substr(), strsplit(), paste(), grep(), toupper(), and tolower(), and provide examples of their usage.

**Assignment - II**

- Q.1 what do you mean by R vectors, explain in detail. Discuss how to access vector elements, assign names to vector elements, and perform mathematical operations on vectors.
- (b) Describe arrays in R. Perform calculations across array elements. Provide examples for each concept to demonstrate their usage.



Q.2 (a) what is R lists? Explain how to determine the size of a list, merge multiple lists, and convert a list to a vector.

(b) Describe matrices in R. Explain different operation of matrix in R.

Q.3 (a) what is Data Frame in R. Discuss the functions used to access and explore data in a data frame.

(b) What do you understand by data visualization in R? Provide examples to illustrate each visualization type and its usage.