PRACTICAL NO 4 :-Implementation of matrix, array and factors and perform va in R.

Theory:-

R - Matrices

Matrices are the R objects in which the elements are arranged in a two-dimensional rectangular layout. They contain elements of the same atomic types. Though we can create a matrix containing only characters or only logical values, they are not of much use. We use matrices containing numeric elements to be used in mathematical calculations.

A Matrix is created using the matrix() function.

Syntax

The basic syntax for creating a matrix in R is −

```
matrix(data, nrow, ncol, byrow, dimnames)
```

Following is the description of the parameters used −

- data is the input vector which becomes the data elements of the matrix.
- nrow is the number of rows to be created.
- ncol is the number of columns to be created.
- byrow is a logical clue. If TRUE then the input vector elements are arranged by row.
- dimname is the names assigned to the rows and columns.

R - Arrays

Arrays are the R data objects which can store data in more than two dimensions. For example − If we create an array of dimension (2, 3, 4) then it creates 4 rectangular matrices each with 2 rows and 3 columns. Arrays can store only data type.

An array is created using the array() function. It takes vectors as input and uses the values in the dim parameter to create an array.

```
# Create two vectors of different lengths.
vector1 <- c(5,9,3)
vector2 <- c(10,11,12,13,14,15)

# Take these vectors as input to the array.
result <- array(c(vector1,vector2),dim = c(3,3,2))
print(result)
```

- **Naming Columns and Rows**

We can give names to the rows, columns and matrices in the array by using the dimnames parameter.

- **Calculations Across Array Elements**

We can do calculations across the elements in an array using the apply() function.

Syntax

```
apply(x, margin, fun)
```

Following is the description of the parameters used −

- x is an array.
- margin is the name of the data set used.
- fun is the function to be applied across the elements of the array.

R - Factors

Factors are used to categorize data. Examples of factors are:

- Demography: Male/Female
- Music: Rock, Pop, Classic, Jazz
- Training: Strength, Stamina

To create a factor, use the factor() function and add a vector as argument

Factors are the data objects which are used to categorize the data and store it as levels. They can store both strings and integers. They are useful in the columns which have a limited number of unique values.

Factors in Data Frame

On creating any data frame with a column of text data, R treats the text column as categorical data and creates factors on it.

- **print the levels**:-use the levels() function:
- **Factor Length:-**Use the length() function to find out how many items there are in the factor:
- **Access Factors:-**To access the items in a factor, refer to the index number, using [] brackets:
- **Generating Factor Levels:-**We can generate factor levels by using the gl() function. It takes two integers as input which indicates how many levels and how many times each level.
- **Syntax** gl(n, k, labels)

Following is the description of the parameters used −

- n is a integer giving the number of levels.
- k is a integer giving the number of replications.
- labels is a vector of labels for the resulting factor levels.

Conclusion:- Thus ,we have studied Array,Matrices,and Factors in R programming