NAME

PAGE NO

Title: Data Types, Graphics & Control Structures in R.

Problem Statement: To study & practice various commands using different Data Types Graphics & Control Structures on R tool & study & practice of various control Structure.

Pre-Lab: A basic understanding of any of the programming languages will help in executing simple R commands & control Structure.

Theory:

A. Data Types in R:

In contrast to other programming language like C & java in R, the variables are not declared as some data type. The variables are assigned with R-Objects & the data type of the R-object becomes the data type of the variable. The frequent used ones are -

- Vectors
- Arrays
- Lists
- Factors
- Matrices
- Data Frames

The simplest of these objects is the vector object & there are six data types of these atomic vectors, also termed as six classes of vectors.

Data Type	Example
Logical	TRUE , false
Numeric	12.3 , 5 , 999
Integer	2L , 34L , 0L
Complex	3+2i
Character	'a' , "good" , "TRUE"
Raw	"Hello" is stored as 48656C6C6F

1. Vectors:

When you want to create vector with more than one element, you should use c() function which means to combine the element into a vector

2. List:

A List is an R-object which can contain many different type of elements inside it like vectors, functions & even another list inside it.

3 Matrices:

A list is an R-object which can contain many diffent type. It can be created using a vector input to the matrix function.

4 Arrays:

While matrices are confined to two dimensions, arrays can be of any number of dimensions. The array function takes a dim attribute which creates the required number of dimensions.

5 Factors:

Factors are the r-objects which are created using a vector. It stores the vector along with the distinct values of the elements in the

EXPT. NO | NAME | Page No.

vector as labels. They are useful in statistical modeling.

Factors are created using the factor() function. The nlevels functions gives the count of levels

6. Data Frames.

Data Frames are tabular data objects. Unlike a matrix in data Frame each column can contain different modes of data. The first column can be numeric while the second column can be character & third column can be logical. It is a list of vectors of equal length.

Data Frames are created using data.frame() function

On vectors, lists & matrices arithmetic function can be performed using the basic arithmatic syntax.

B Graphics :

R programming language has numerous libraries to create charts & graphs.

1. Pie Charts :

A pie-chart is a representation of values as slices of a circle with different colors. The slices are labeled and the number corresponding to each slice is also represented in the chart. The basic syntax for creating pie chart using R-

pie(x, labels, radius, main, col, clockwise)

Following is the desceiption of the paametees used-
- x is a vectoe oe a foemula
- data is the data feame
- notch is a logical value. Set as teue to deaw width of the box peopoetionate to the sample size.
- names aee the geoup labels which will be peinted undee each box plot
- Main is used to give Little to the geaph.

4. Histogeams:

A histogeams eepeesent the feequencies of values of a vaeiable bucketed into eanges Histogeam is similae to bae chaet but the diffeeence is it geoups the values into eanges

R ceeates histogeam using hist() function. This function takes a vectoe as an input & uses some moee paametees to plot histogeams.

The basic syntax foe ceeating a histogeam using R is-

hist (V, main, xlab, xlim, ylim, beeaks, col, boedee)

Following is the desceiption of paeametees used-
- V is a vectoe containing numeeic values used in histogeam.
- main indicates title of the chaet.

- xlab is the label in the horizontal axis
- ylab is label in vertical axis.
- xlim is the limits of the values of x used for plotting.
- ylim is the limits of the values of y used for plotting
- axes indicates whether both axes should be drawn on the plot.

C. Control Structures in R:

As the name suggest, a control structure 'controls' the flow of code. A function is a set of multiple commands written to automate a repetative coding task.

1. If, else: This structure is used to test a condition. Below is the syntax:

```
if (condition) {
        # do something
} else {
        # do something else
}
```

4 For: This structure is used when a loop is to be executed fixed number of times. It is commonly used for iterating over the elements of an object

Teacher's Signature:

EXPT. NO. NAME:

Page No.

8. Break :

A break statement is used inside a loop (repeat, for, while) to stop the iterations and flow the control outside the loop.

In a nested looping situation, where there is a loop inside loop, the statement exits from the innermost loop that is being evaluated.

Below is the syntax :

break.

Post Lab : Students will be able to execute various R commands & use control structures on R tool and R studio for the application.

Conclusion : The exercised Basic syntax, Data types, Variables, Operators, Vectors, Lists, Matrices, Data Frames, Factors, Various types of graphs & the control structures taking suitable examples.