**INSTRUCTIONS TO STUDENTS**

* Students should be regular and come prepared for the lab practice.
* In case a student misses a class, it is his/her responsibility to complete that missed experiment(s)
* Students should bring the observation book, prescribed textbook and class note for the reference.
* Once the experiment(s) get executed, they should show the results to the instructors and copy the same in their observation book.
* The experiments have to be implemented using R / R-Studio .

**PROCEDURE FOR EVALUATION**

The entire lab course consists of 100 marks. The marking scheme is as follows

|  |  |
| --- | --- |
| Continuous Evaluation marks | 60 |
| End Sem. Lab Examination | 40 |
| **Total** | **100** |

**Scheme for continuous evaluation**

Students will be evaluated bi-weekly. The scheme is as follows:

|  |  |
| --- | --- |
| R-Script Programs & Execution | 10 |
| Observation | 10 |
| Quiz | 10 |
| Viva-Voce | 10 |
| Record | 20 |
| **Total** | **60** |

**Scheme for end sem lab examination**

End sem. lab exam will be conducted after the completion of all the weekly exercises. The student will not be allowed for exam if he/she is found short of attendance and has not completed all the experiments. The marking scheme for end sem lab exam is as follows:

|  |  |
| --- | --- |
| Writing of R-Script Programs & commands | 15 |
| R- Script Program execution & Checking Results for all inputs | 15 |
| Final Viva-Voce | 10 |
| **Total** | **40** |

**Objectives**

* Explore and understand how to use the R documentation
* Expand R by installing R packages
* Read Structured Data into R from various sources
* Understand the different data types and structures in R
* Using R for mathematical operations
* Use of vectorized and matrix calculations
* Write user-defined and looping constructs R functions
* Reshape data to support different analyses

**Outcomes**

* Able to install and configure R
* Able to install different packages
* Able to import and export files
* Able to perform mathematical operations
* Able to perform operations for matrix and vectors
* Able to perform analysis of data in different perspective.

**EXPERIMENT-01**

**(R-Overview, Environment Setup, Data Types, Variables, Operators, Basic Syntax)**

1.1- Initialize some variables in the R workspace. Now analyze and display what are variables are created, then delete the single variable as well as all the created variables.

1.2- Initialize some variables with different types of value. Now analyze what is the type of those variables.

1.3- Write an R-script to initialize your roll no., name and branch then display all the details.

1.4- Write an R-script to initialize two variables, then find out sum of them.

1.5- Write an R-script to enter two numbers from the keyboard, then perform the four arithmetic operations on them.

1.6- Write an R-script to enter a 3-digits number from the keyboard, then find out sum of all the 3- digits.

1.7- Write an R-script to enter the radius of a circle, then calculate the area and circumference of the circle.

1.8- Write an R-script to calculate the compound interest of the given P, T, R.

1.9- Write an R-script to enter two numbers from the keyboard, then swap them without using 3rd variable.

1.10- Write an R-script to enter two numbers and implement all the relational operators on that two

numbers.

**EXPERIMENT-02**

**(Decision making-simple if, if…else, if…else if…else, switch etc.)**

2.1- Write an R-script to analyze the given number is positive using simple if statement.

2.2- Write an R-script to check whether the given number is positive or not using if…else

statement?

2.3- Write an R-script to analyze whether the given year is a leap year or not?

2.4- Write an R-script to enter two numbers and find out the biggest one.

2.5- Write an R-script to enter a 3-digits number and check whether it is palindrome no. or not?

2.6- Write an R-script to enter marks in 3 subjects and then calculate the total mark and percentage.

Also assign the grade according to the B.Tech evaluation system.

2.7- Write an R-script to design a menu driven program as follows and then evaluate any one of the

operation acc. to your choice using switch case statement.

1. Area of circle

2. Area of rectangle

3. Area of Triangle

2.8- Write an R-script to design a menu driven program as follows and then display any one of the

color acc. to your choice using switch case statement.

R- Red

G- Green

B- Blue

Y- Yellow

**EXPERIMENT-03**

**(Loops- while, for, repeat loop)**

3.1- Write an R-script to generate the number series as follows using while loop-

1 4 9…………N2

3.2- Write an R-script to find out the factorial of the given no. using for loop

3.3- Write an R-script to evaluate the sum of the following number series using repeat loop-

12+32+………..+392

3.4- Write an R-script to analyze the given no. is palindrome no. or not?

3.5- Write an R-script to check the given no. is perfect no. or not?

3.6- Write an R-script to generate the Fibonacci series up to N terms.

3.7- Write an R-script to generate the following pattern-

1

2 3

4 5 6

7 8 9 10

3.8- Write an R-script to generate the following pattern-

\*

\* \*

\* \* \*

\* \* \* \*

**EXPERIMENT-04**

**(Functions- Built-in Functions, User-defined Functions)**

4.1- Analyze and implement the built-in functions in the R-workspace.

4.2- Write an R-script to evaluate average of 3 numbers using function.

4.3- Write an R-script to find out the factorial of a number using function.

4.4- Write an R-script to find out HCF and LCM of the given two numbers using function.

4.5- Write an R-script to evaluate sum of the following series using recursive function-

1+2+3+………………. +N

4.6- Write an R-script to display the reverse of the given no. using recursive function.

4.7- Write an R-script to evaluate the simple interest of the given P, T, R using function,

where function takes the default value for R.

**EXPERIMENT-05**

**(Strings with built-in string functions)**

5.1- Analyze and implement the built-in string functions in the R-workspace.

5.2- Write an R-script to count the no. of characters within a string without space.

5.3- Write an R-script to extract a sub-string of 5 characters from the given string and replace that sub-string with "India" within the original string.

5.4- Write an R-script to check and count the total no. of vowels within the given string.

5.5- Write an R-script to enter two strings from the keyboard and check the both strings are equal or not?

5.6- Write an R-script to reverse a string and display that.

5.7- Write an R-script to search a specific sub-string from a string and display its position. Now insert a new string at that position without changing anything.

**EXPERIMENT-06**

**(Vectors- Single element vector, multiple element vector, and Lists)**

6.1- Write an R-script to initialize 5 elements to a vector and then find out square root of each and every element.

6.2- Write an R-script to initialize two vectors and then check both vectors are equal or not?

6.3- Write an R-script to initialize two vectors with 1s and 0s. Now perform AND operation with two vectors.

6.4- Write an R-script to enter the elements of a vector from the keyboard and sort the elements of vector in ascending order.

6.5- Write an R-script to initialize two vectors and then evaluate the 1st vector raised to the power of 2nd vector.

6.6- Write an R-script to initialize a vector and then find out minimum value and maximum value, also evaluate the sum of all the elements.

6.7- Write an R-script to initialize a vector and then search a specific element from that vector.

6.8- Write an R-script to create a list with different types of data set. Now display each data set separately according to the data type.

6.9- Write an R-script to create a list having vector, matrix and a list. Now display only the 2nd data set of the list.

6.10- Write an R-script to add a new data set to the previous list and also remove the 2nd data set from that list.

6.11- Write an R-script to create two lists- one contains the integers from 1 to 5 and another contains the name of 5 months. Now merge two lists and display that.

**EXPERIMENT-07**

**(Matrices, Arrays)**

7.1- Write an R-script to create a 4\*3 matrix. Now display the elements of row1, row3 and column2 of that matrix.

7.2- Write an R-script to create two matrix and then perform addition, subtraction, multiplication and division of them.

7.3- Write an R-script to create a 3\*3 matrix and update that matrix by adding 4 to each and every element, also display the updated matrix.

7.4- Write an R-script to set those elements of the created matrix to 0, whose value are less than 5.

7.5- Write an R-script to check the given matrix is symmetric matrix or not?

7.6- Write an R-script to create a matrix and evaluate the sum of the elements row-wise.

7.7- Write an R-script to create an array having 3 dimensions. Now retrieve the elements of 2nd row of 3rd matrix.

7.8- Write an R-script to create an array having 3 dimensions. Now calculate the sum of the rows across all the matrices.

**EXPERIMENT-08**

**(Factors, Packages)**

8.1- Write an R-script to check the given vector is a factor or not? if not, then convert it into factor and display that with levels.

8.2- Write an R-script to create a vector having 10 names, where some names are repeated. Now convert it to a factor and display it to check the levels, then change the order of levels in alphabetical order and display it.

8.3- Write an R-script to implement g1( ) having four strings with specifying levels and replications.

8.4- Write a command to check the location of the available packages in R workspace.

8.5- Write a command to get the installed packages in R. Also display the packages which are currently loaded.

8.6- Write a command to install the XML package and also load that package into the current R environment.

8.7- Write a command to check whether the specified package is installed or not?

**EXPERIMENT-09**

**(Data Frames)**

9.1- Write an R-script to create a Player data frame having the fields player\_no, name, age, profession and grade with 5 records. Now display all the players details, also display the structure and summary of that data frame.

9.2- Write an R-script to retrieve and display only the name and grade of the Player data frame.

9.3- Write an R-script to extract the first 3 rows from the Player data frame.

9.4- Write an R-script to extract 2nd and 5th row with 1st and 3rd column from the Player data frame.

9.5- Write an R-script to add a new column as DOB with all the values in Player data frame. Now display the updated data frame.

9.6- Write an R-script to append 2 new rows to the Player data frame then display the updated data

frame.

**EXPERIMENT-10**

**(Data Interfaces- CSV Files, Excel Files)**

10.1- Create a CSV file as Student.csv having 5 columns as rollno, name, branch, percentage and DOA with 10 records. Now read the Student.csv file to the R- workspace and display that.

10.2- Retrieve and display the details of that student who has maximum percentage.

10.3- Retrieve and display the details of those students who are studying in IT branch.

10.4- Retrieve and display the details of those CSE students who are securing percentage >=80.

10.5- Retrieve and display the details of those students who are admitted on or after 1st may 2016.

10.6- Create an Excel file as Student.xlsx, where sheet1 contains rollno, name, branch, percentage and sheet2 contains name, DOA with 10 records. Now install and load xlsx package to the R- workspace.

10.7- Read the details of sheet1 from Student.xlsx to the R- workspace and display that, then read from the sheet2 and display that.

10.8- Write the commands to merge and read the data set of two sheets of Student.xlsx to the R- workspace and display that.

10.9- Write the commands to read the data sets from the R- workspace and write that to the new Excel file.