**B.DATA STRUCTURES IN R**

**1) Perform Addition, Subtraction, Multiplication and Transpose of a Matrix in R**

**Aim: To Execute the Addition, Subtraction, Multiplication and Transpose of a Matrix in R Programming**

**Procedure:**

**1)Create two matrices, matrix1 and matrix2**

**2)Use the + operator to add the matrices element-wise. Store the result in addition\_result**

**3)Use the - operator to subtract one matrix from another element-wise. Store the result in subtraction\_result**

**4)Use the %\*% operator for matrix multiplication. Transpose matrix2 using the t() function before multiplying with matrix1. Store the result in multiplication\_result**

**5)Use the t() function to transpose matrix1. Store the result in transpose\_result.**

**Program:**

**matrix1 <- matrix(c(1, 2, 3, 4, 5, 6), nrow = 2, ncol = 3)**

**matrix2 <- matrix(c(7, 8, 9, 10, 11, 12), nrow = 2, ncol = 3)**

**addition\_result <- matrix1 + matrix2**

**subtraction\_result <- matrix1 - matrix2**

**multiplication\_result <- matrix1 %\*% t(matrix2) # Use %\*% for matrix multiplication**

**transpose\_result <- t(matrix1)**

**print("Addition Result:")**

**print(addition\_result)**

**print("Subtraction Result:")**

**print(subtraction\_result)**

**print("Multiplication Result:")**

**print(multiplication\_result)**

**print("Transpose Result:")**

**print(transpose\_result)**

**Output:**

**[1] "Addition Result:"**

**[,1] [,2] [,3]**

**[1,] 8 10 12**

**[2,] 14 16 18**

**[1] "Subtraction Result:"**

**[,1] [,2] [,3]**

**[1,] -6 -6 -6**

**[2,] -6 -6 -6**

**[1] "Multiplication Result:"**

**[,1] [,2]**

**[1,] 50 68**

**[2,] 122 167**

**[1] "Transpose Result:"**

**[,1] [,2]**

**[1,] 1 4**

**[2,] 2 5**

**[3,] 3 6**

**Result : Hence the program is verified and executed successfully in Addition, Subtraction, Multiplication and Transpose of a Matrix in R.**

**2) Find Transpose of a matrix in R and deconstruct a matrix.**

**3) Perform the operation of combining matrices in R using cbind() and rbind() functions.**

**4) Perform array manipulation in R .**

**5) Perform calculations across array elements in an array using the apply() function.**

**6) Create a data frame and print the structure of the data frame in R.**

**7) Demonstrate the creation of S3 class and S4 class in R.**

**8) Demonstrate the creation of a Reference class in R by defining a class called students with fields – Name, Age , GPA. Also illustrate how the fields of the object can be accessed using the $ operator. Modify the Name field by reassigning the name to Paul.**