**Roll No:-**

**Assignment No:- 2**

**Assignment Name:- Write program for creating and manipulating R objects in R-Vectors,Matrices,Array,Dataframes,List.**

**Atomic Vector:-**

**Numeric vector: -**

num\_vec<-c(10.1, 10.2, 33.2)

num\_vec

**Integer vector: -**

num<-c(2L,6L,4L,9L)

num

**Character vector: -**

fruits<-c("Mango","apple","papaya")

print(fruits)

**Logical vector: -**

a<-as.integer(20)

b<-as.integer(10)

log\_vec<-c(a<b,b<a,a>b,b>a)

log\_vec

**Operations on Vector: -**

1)combining vectors:

data\_vec<-c(names,num)

data\_vec

**2)Arithmetic operations:**

a<-c(1,3,5,7)

b<-c(2,4,6,8)

a+b

a-b

a\*b

a/b

**3)Logical Index vector:**

z<-c(1,2,3,4,5,6)

z[c(TRUE,FALSE,TRUE,TRUE,FALSE,TRUE)]

**4)Numeric Index: -**

q<-c("shubham","arpita","nishka","gunjan","vaishali","sumit")

q[2]

q[-4]

q[15]

**5)Duplicate Index: -**

q<-c("shubham","arpita","nishka","gunjan","vaishali","sumit")

q[c(2,4,4,3)]

**6)Range Indexes: -**

q<-c("shubham","arpita","nishka","gunjan","vaishali","sumit")

b<-q[2:5]

b

**7)out-of-order Indexes: -**

q<-c("shubham","arpita","nishka","gunjan","vaishali","sumit")

q[c(2,1,3,4,5,6)]

**8)Named vectors members: -**

z=c("Roshani","Kawale")

z

names(z)=c("FirstName","LastName")

z

z["FirstName"]

**OUTPUT: -**

> #Numeric vector: -

> num\_vec<-c(10.1, 10.2, 33.2)

> num\_vec

[1] 10.1 10.2 33.2

>

> #Integer vector: -

> num<-c(2L,6L,4L,9L)

> num

[1] 2 6 4 9

>

> #Character vector: -

> fruits<-c("Mango","apple","papaya")

> print(fruits)

[1] "Mango" "apple" "papaya"

>

> #Logical vector: -

> a<-as.integer(20)

> b<-as.integer(10)

> log\_vec<-c(a<b,b<a,a>b,b>a)

> log\_vec

[1] FALSE TRUE TRUE FALSE

>

> #Operations on Vector: -

> #1)combining vectors:

> data\_vec<-c(names,num)

> data\_vec

[[1]]

function (x) .Primitive("names")

[[2]]

[1] 2

[[3]]

[1] 6

[[4]]

[1] 4

[[5]]

[1] 9

>

> #2)Arithmetic operations:

> a<-c(1,3,5,7)

> b<-c(2,4,6,8)

> a+b

[1] 3 7 11 15

> a-b

[1] -1 -1 -1 -1

> a\*b

[1] 2 12 30 56

> a/b

[1] 0.5000000 0.7500000 0.8333333 0.8750000

>

> #3)Logical Index vector:

> z<-c(1,2,3,4,5,6)

> z[c(TRUE,FALSE,TRUE,TRUE,FALSE,TRUE)]

[1] 1 3 4 6

>

>

> #4)Numeric Index: -

> q<-c("shubham","arpita","nishka","gunjan","vaishali","sumit")

> q[2]

[1] "arpita"

> q[-4]

[1] "shubham" "arpita" "nishka" "vaishali" "sumit"

> q[15]

[1] NA

>

> #5)Duplicate Index: -

> q<-c("shubham","arpita","nishka","gunjan","vaishali","sumit")

> q[c(2,4,4,3)]

[1] "arpita" "gunjan" "gunjan" "nishka"

>

> #6)Range Indexes: -

> q<-c("shubham","arpita","nishka","gunjan","vaishali","sumit")

> b<-q[2:5]

> b

[1] "arpita" "nishka" "gunjan" "vaishali"

>

> #7)out-of-order Indexes: -

> q<-c("shubham","arpita","nishka","gunjan","vaishali","sumit")

> q[c(2,1,3,4,5,6)]

[1] "arpita" "shubham" "nishka" "gunjan" "vaishali" "sumit"

>

> #8)Named vectors members: -

> z=c("Roshani","Kawale")

> z

[1] "Roshani" "Kawale"

> names(z)=c("FirstName","LastName")

> z

FirstName LastName

"Roshani" "Kawale"

> z["FirstName"]

FirstName

"Roshani"

**#creation of matrix:-**

P <- matrix(c(5:16), nrow = 4, byrow = TRUE)

print(P)

Q <- matrix(c(3:14), nrow = 4, byrow = FALSE)

print(Q)

**#operations on Matrix:-**

**#1)Addition:-**

sum<-P+Q

print(sum)

**#2)Subtraction:-**

sub<-P-Q

print(sub)

**#3)Multiplication(\*):-**

mult<-P\*Q

print(mult)

**#4)Multiplication(by constant):-**

mult<-P\*5

print(mult)

**#5)Division:-**

div<-P/Q

div

**OUTPUT:-**

**#**creation of matrix:-

> P <- matrix(c(5:16), nrow = 4, byrow = TRUE)

> print(P)

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

[1,] 5 6 7

[2,] 8 9 10

[3,] 11 12 13

[4,] 14 15 16

>

> Q <- matrix(c(3:14), nrow = 4, byrow = FALSE)

> print(Q)

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

[1,] 3 7 11

[2,] 4 8 12

[3,] 5 9 13

[4,] 6 10 14

>

**>** #operations on Matrix:-

> #1)Addition:-

> sum<-P+Q

> print(sum)

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

[1,] 8 13 18

[2,] 12 17 22

[3,] 16 21 26

[4,] 20 25 30

> #2)Subtraction:-

> sub<-P-Q

> print(sub)

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

[1,] 2 -1 -4

[2,] 4 1 -2

[3,] 6 3 0

[4,] 8 5 2

> #3)Multiplication(\*):-

> mult<-P\*Q

> print(mult)

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

[1,] 15 42 77

[2,] 32 72 120

[3,] 55 108 169

[4,] 84 150 224

> #4)Multiplication(by constant):-

> mult<-P\*5

> print(mult)

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

[1,] 25 30 35

[2,] 40 45 50

[3,] 55 60 65

[4,] 70 75 80

> #5)Division:-

> div<-P/Q

> div

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

[1,] 1.666667 0.8571429 0.6363636

[2,] 2.000000 1.1250000 0.8333333

[3,] 2.200000 1.3333333 1.0000000

[4,] 2.333333 1.5000000 1.1428571

>

**#creation of Arrays:-**

vec1 <-c(1,3,5)

vec2 <-c(10,11,12,13,14,15)

res <- array(c(vec1,vec2),dim=c(3,3,2))

print(res)

**#Naming Of Arrays**

col\_names <- c("Col1","Col2","Col3")

row\_names <- c("Row1","Row2","Row3")

matrix\_names <- c("Matrix1","Matrix2")

res <- array(c(vec1,vec2),dim=c(3,3,2),dimnames=list(row\_names,col\_names,matrix\_names))

print(res)

**OUTPUT: -**

#creation of Arrays:-

> vec1 <-c(1,3,5)

> vec2 <-c(10,11,12,13,14,15)

> res <- array(c(vec1,vec2),dim=c(3,3,2))

> print(res)

, , 1

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

[1,] 1 10 13

[2,] 3 11 14

[3,] 5 12 15

, , 2

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

[1,] 1 10 13

[2,] 3 11 14

[3,] 5 12 15

>

> #Naming Of Arrays

> col\_names <- c("Col1","Col2","Col3")

> row\_names <- c("Row1","Row2","Row3")

> matrix\_names <- c("Matrix1","Matrix2")

> res <- array(c(vec1,vec2),dim=c(3,3,2),dimnames=list(row\_names,col\_names,matrix\_names))

> print(res)

, , Matrix1

Col1 Col2 Col3

Row1 1 10 13

Row2 3 11 14

Row3 5 12 15

, , Matrix2

Col1 Col2 Col3

Row1 1 10 13

Row2 3 11 14

Row3 5 12 15

**#Creation Of DataFrame**

stud.data<- data.frame(

student\_id = c (1:5),

student\_name = c("Shubham","Arpita","Nishka","Gunjan","Sumit"),

class = c("MBA","MCA","MBA","IMCA","MCA"),

roll\_no=c(20,45,78,12,50)

)

print(stud.data)

**#Operations on DataFrame:-**

**1)Extracting specific columns from a data frame**

final <- data.frame(stud.data$student\_id,stud.data$class)

print(final)

**2)Modification of DataFrame:**

**#Adding row in the data frame**

x <- list(6,"Vaishali","IMCA",15)

rbind(stud.data,x)

**#Adding column in the data frame**

y <- c("Moradabad","Lucknow","Etah","Sambhal","Khurja")

cbind(stud.data,city=y)

**#Delete rows from data frame**

stud.data<-stud.data[-1,]

print(stud.data)

**#Delete column from the data frame**

stud.data$roll\_no<-NULL

print(stud.data)

**OUTPUT:-**

#Creation Of DataFrame

> stud.data<- data.frame(

+ student\_id = c (1:5),

+ student\_name = c("Shubham","Arpita","Nishka","Gunjan","Sumit"),

+ class = c("MBA","MCA","MBA","IMCA","MCA"),

+ roll\_no=c(20,45,78,12,50)

+ )

> print(stud.data)

student\_id student\_name class roll\_no

1 1 Shubham MBA 20

2 2 Arpita MCA 45

3 3 Nishka MBA 78

4 4 Gunjan IMCA 12

5 5 Sumit MCA 50

> #operations on DataFrame:-

> #Extracting specific columns from a data frame

> final <- data.frame(stud.data$student\_id,stud.data$class)

> print(final)

stud.data.student\_id stud.data.class

1 1 MBA

2 2 MCA

3 3 MBA

4 4 IMCA

5 5 MCA

> #Modification of DataFrame

> #Adding row in the data frame

> x <- list(6,"Vaishali","IMCA",15)

> rbind(stud.data,x)

student\_id student\_name class roll\_no

1 1 Shubham MBA 20

2 2 Arpita MCA 45

3 3 Nishka MBA 78

4 4 Gunjan IMCA 12

5 5 Sumit MCA 50

6 6 Vaishali IMCA 15

> #Adding column in the data frame

> y <- c("Moradabad","Lucknow","Etah","Sambhal","Khurja")

> cbind(stud.data,city=y)

student\_id student\_name class roll\_no city

1 1 Shubham MBA 20 Moradabad

2 2 Arpita MCA 45 Lucknow

3 3 Nishka MBA 78 Etah

4 4 Gunjan IMCA 12 Sambhal

5 5 Sumit MCA 50 Khurja

> #Delete rows from data frame

> stud.data<-stud.data[-1,]

> print(stud.data)

student\_id student\_name class roll\_no

2 2 Arpita MCA 45

3 3 Nishka MBA 78

4 4 Gunjan IMCA 12

5 5 Sumit MCA 50

> #Delete column from the data frame

> stud.data$roll\_no<-NULL

> print(stud.data)

student\_id student\_name class

2 2 Arpita MCA

3 3 Nishka MBA

4 4 Gunjan IMCA

5 5 Sumit MCA

>

**#creation of List:-**

list\_1<-list("Shubham","Arpita","Vaishali")

list\_1

list\_data<-list("Shubham","Arpita",c(1,2,3,4,5),TRUE,FALSE,22.5,12L)

print(list\_data)

**#Operation on lists:-**

**1)Giving name to list:-**

list\_data <- list(c("Shubham","Nishka","Gunjan"), matrix(c(40,80,60,70,90,80), nrow = 2),

list("BCA","MCA","B.tech"))

names(list\_data) <- c("Students", "Marks", "Course")

list\_data

**2)Accessing elements using index:-**

print(list\_data[1])

**3)Accessing elements using names:-**

print(list\_data["Students"])

print(list\_data$Marks)

**4)Merging Lists:-**

Even\_list <- list(2,4,6)

Odd\_list <- list(1,3,5)

# Merging the two lists.

merged.list <- list(Even\_list,Odd\_list)

print(merged.list)

--------------------------------------------------------------------------------------------------------------------------

**OUTPUT: -**

#creation of List:-

> list\_1<-list("Shubham","Arpita","Vaishali")

> list\_1

[[1]]

[1] "Shubham"

[[2]]

[1] "Arpita"

[[3]]

[1] "Vaishali"

> list\_data<-list("Shubham","Arpita",c(1,2,3,4,5),TRUE,FALSE,22.5,12L)

> print(list\_data)

[[1]]

[1] "Shubham"

[[2]]

[1] "Arpita"

[[3]]

[1] 1 2 3 4 5

[[4]]

[1] TRUE

[[5]]

[1] FALSE

[[6]]

[1] 22.5

[[7]]

[1] 12

> #Operation on lists:-

> #1)Giving name to list:-

> list\_data <- list(c("Shubham","Nishka","Gunjan"), matrix(c(40,80,60,70,90,80), nrow = 2),

+ list("BCA","MCA","B.tech"))

> names(list\_data) <- c("Students", "Marks", "Course")

> list\_data

$Students

[1] "Shubham" "Nishka" "Gunjan"

$Marks

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

[1,] 40 60 90

[2,] 80 70 80

$Course

$Course[[1]]

[1] "BCA"

$Course[[2]]

[1] "MCA"

$Course[[3]]

[1] "B.tech"

> #2)Accessing elements using index:-

> print(list\_data[1])

$Students

[1] "Shubham" "Nishka" "Gunjan"

> #3)Accessing elements using names:-

> print(list\_data["Students"])

$Students

[1] "Shubham" "Nishka" "Gunjan"

> print(list\_data$Marks)

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

[1,] 40 60 90

[2,] 80 70 80

> #4)Merging Lists:-

> Even\_list <- list(2,4,6)

> Odd\_list <- list(1,3,5)

> # Merging the two lists.

> merged.list <- list(Even\_list,Odd\_list)

> print(merged.list)

[[1]]

[[1]][[1]]

[1] 2

[[1]][[2]]

[1] 4

[[1]][[3]]

[1] 6

[[2]]

[[2]][[1]]

[1] 1

[[2]][[2]]

[1] 3

[[2]][[3]]

[1] 5