

**M. SC. (APPLIED STATISTICS)
(MSCAST)**

**Term-End Examination
December, 2024**

MST-015 : INTRODUCTION TO R SOFTWARE

Time : 2 Hours

Maximum Marks : 25

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any **two** questions out of the remaining Question Nos. 2 to 4.*

(iii) *Use of scientific calculator (non-programmable) is allowed.*

(iv) *Symbols have their usual meanings.*

1. Answer the following : 5×1=5

(a) What is the use of assignment operator ?
Write any **two** assignment operators available in R.

(b) Is there any difference between the usage of **help()** and **help.search()** functions for help ?

(c) Write the output of the following statement :
sum(C (1:5, NA, NA, NA, 6:10))

- (d) Which of the following user defined function names are inappropriate and why ?

(i) **tan**

(ii) **length**

- (e) Write an assignment statement equivalent to the following equation in R :

$$\text{Area} = \pi r^2 + \pi r l$$

2. (a) Write a R command to obtain the frequency table and create a strip chart of the following data by controlling overplotting and using the **rep()** function :

3

5 5 5 5 5 4 4 4 4 3 3 3 2 2 1

- (b) Write a R command that generates the following sequence of time :

2

“2021-08-10”

“2022-08-10”

“2023-08-10”

- (c) Write step-by-step execution of the following loop :

5

data ← **head (USArrests)**

i ← 1

repeat {

data [, **i**] ← **data** [, **i**]/**mean (data** [, **i**)

if (**i** == 3) **break**

i ← **i** + 1

}

3. (a) Write the name of the different types of **if** statements available in R. Also, write the general syntax of each one of them and explain how they are executed. 3
- (b) Write R code to compute the coefficients of skewness and kurtosis β_1 and β_2 of the data x_1, x_2, x_3, x_4 and x_5 using user defined functions. Also, give the printing command for printing β_1 and β_2 using the **cat()** function. 3
- (c) Write step-by-step execution of the following code : 4

```

y ← -5
p ← 1
if (y >= 0) {
  while (y > 0) {
    p ← p*y; cat("p=", p, "\n")
    y ← y - 1; cat("y=", y, "\n")}
} else {
  while (y > 0) {
    p ← p/y; cat("p=", p, "\n")
    y ← y + 1; cat("y=", y, "\n")}
}
cat ("p =", p, "\n")

```

4. (a) Create two matrices A and B with the following elements : 4

$$A = \begin{pmatrix} 2 & 1 & 1 \\ 1 & -2 & 2 \\ 9 & 0 & 3 \end{pmatrix}$$

and $B = \begin{pmatrix} 1 & -2 & -1 \\ -2 & 2 & -3 \\ -1 & -3 & 4 \end{pmatrix}$

Combine the two matrices row-wise and assign it to another matrix named C. Then write R commands to do the following tasks :

- (i) Obtain the vectors of column sums and row sums of matrix C.
 - (ii) Extract the even number rows of C.
 - (iii) Drop the odd number columns of C.
 - (iv) Extract the elements of matrix A from C.
- (b) Find the error in the following code : 2

```
x ← matrix (1 : 4, 2, 2)
```

```
(x [0, ] + x [1, ]) / 2
```

Also, rewrite the corrected code.

- (c) Create a data frame named **Data** consisting of the following data : 4

x	y	z	w
0.03	0.15	0.45	A
0.81	0.86	0.73	A
0.31	0.64	0.89	B
0.38	0.92	0.41	B
0.30	0.30	0.68	C
0.82	0.73	0.30	C

Write R commands to :

- (i) rename the columns as **Col1**, **Col2**, **Col3** and **Col4**.
- (ii) compute the row means and column sums of the data frame.
- (iii) sort **Data** according to the **Col2** of it.
- (iv) group the data according to the **w** variable.

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