

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

Term-End Examination

December, 2025

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 (non-programmable) calculator is allowed.*

(iv) *Symbols have their usual meanings.*

1. Answer the following : 5×1=5

(a) Create the following vectors using the 'rep' function :

(i) $\text{Vec 1} = \text{C}(1, 2, 3, 4, 5, 1, 2, 3, 4, 5,$
1, 2, 3, 4, 5)

(ii) $\text{Vec } 2 = C(1, 1, 1, 2, 2, 2, 3, 3, 3,$
 $4, 4, 4, 5, 5, 5)$

- (b) The `skewness()` function is available in which R package ?
- (c) Which function is used to read a CSV file ?
- (d) Write the output of the following statement :

$$\text{seq}(1, 10, \text{by} = 2)$$

- (e) Extract the second component of the following list by two different methods :

$$\text{LST} \leftarrow \text{list}(A = "x", B = "y", C = "z")$$

2. (a) Create a matrix named 'Mat' with row names and column names of the following data : 4

	col 1	col 2	col 3	col 4
row 1	11	43	39	12
row 2	12	04	42	11
row 3	15	17	13	17

Write R commands to do the following tasks :

- (i) Extract the first and third elements of the second and third rows, respectively.
 - (ii) Find the transpose of 'Mat' and save it with name Mat-trans.
- (b) Write the step-by-step execution of the following code :

```
sum = 0
j = 1
for (i in c("S", "T", "A", "T", "S"))
{
  print (i)
  sum = sum + 2 * j
  j = j + 1
}
sum; j
```

- (c) Use the `apply()` function to compute the minimum of each row and maximum of each column of the matrix given below : 2

$$A = \begin{pmatrix} 1 & -1 & -3 \\ 2 & 4 & 9 \\ 0 & 1 & 5 \end{pmatrix}$$

3. (a) You have a dataset with student scores in three subjects across two semesters as follows : 4

Subject	Semester-I	Semester-II
Mathematics	67	72
Statistics	62	78
Computer Science	65	75

Write R commands to create a multiple bar plot to compare the scores of the three subjects across the two semesters. Use different colours for representing each semester, add a legend to

differentiate between the semesters, include main title for the plot and labels for X-axis and Y-axis.

- (b) Write the step-by-step execution of the following code : 4

```
X ← 12
repeat {
    print(X)
    X ← X/2
    if (X < 1) break
}
```

- (c) Given $\text{Vec 1} \leftarrow C(1, 2, NA, 7, 10, NA, 11)$. Write R command to find the positions of NA values using the `is.na()` function and also find the mean of Vec 1 after removing the NA values. 2

4. (a) Write R command to find the median of the following data using if-else statement : 3

58, 60, 63, 75, 53, 70, 67

- (b) Consider the following Student's result data : 5

Name	Sem-I	Sem-II	Sem-III	Sem-IV
Ayush	65	67	77	75
Dev	68	72	76	79
Jeevan	62	67	65	72
Sia	56	61	65	67

Write R commands to :

- (i) Create a data frame with row and column names.
 - (ii) Compute row means.
 - (iii) Find the name of the student who has the highest average marks.
- (c) Write R commands to find the Karl Pearson's and Spearman's correlation between X and Y, where : 2

X : 23, 30, 18, 15, 29

Y : 36, 34, 15, 26, 22

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