



**Chhattisgarh Swami Vivekanand Technical University**

**University Teaching Department**

**B.Tech (Honours) (Data Science/ Artificial Intelligence)**

**Class Test - I, May, 2023**

**R for Data Science(B127475(022))**

*Time Allowed: 2 hours*

*Maximum Marks: 40*

*Minimum Pass Marks: 14*

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- Note: (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.  
(ii) The figure in the right-hand margin indicates marks.
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I. (a) Fill in the blanks:

R uses a \_\_\_\_\_ model, with the client typically being the R console or an IDE and the server being the \_\_\_\_\_. The R interpreter is written in \_\_\_\_\_ and provides core functionality for data manipulation, statistical analysis, and graphics. R uses a \_\_\_\_\_ system to automatically free memory that is no longer needed by the program. [4]

(b) Discuss the history and overview of the R programming language, highlighting its key milestones and characteristics. [8]

(c) A fitness club has recently recorded the weights (in kilograms) of six randomly chosen members. The weights are as follows: 68, 73, 82, 60, 88, and 77 kg. The club wants to analyse the data to understand the weight distribution of their members better. They are particularly interested in the average weight, minimum and maximum weights, and the weight range (difference between the highest and lowest weights). They also want to extract the weights of the first three members for a separate analysis.

Using R, perform the following tasks:

1. Create a vector containing the weights of the six members.
2. Calculate the average weight of the six members.
3. Determine the minimum and maximum weights.
4. Calculate the weight range.
5. Assign the weights of the first three members to a new vector.
6. Extract the length of the new vector.

[8]



(d) A marketing agency is creating a promotional campaign for a client. They have collected a list of taglines for different products and want to analyse them. The taglines are:

"Be the change."

"The perfect fit."

"Taste the difference."

Using R, perform the following tasks:

1. Create strings for each of the taglines.
2. Concatenate the three taglines into one string, separating each tagline with a newline character.
3. Extract a substring from the first tagline (characters 4 to 6).
4. Check if the word "perfect" is present in each of the taglines.

[8]

- II. (a) Define a matrix in R and explain how you can fill it with values using row and column bindings. Also, provide an example of a matrix filled with random values using these techniques.

[4]

(b) Fill in the Blanks:

1. `mat <- matrix(c(1, 2, 3, 4, 5, 6), nrow = 2, ncol = _____)`  
`print(mat)`

2 & 3. `mat1 <- matrix(c(1, 2, 3, 4), nrow = 2)`  
`mat2 <- matrix(c(5, 6, 7, 8), nrow = 2)`

`row_bind <- _____(mat1, mat2)`

`col_bind <- _____(mat1, mat2)`

4. `transpose <- _____(mat)`

5. `identity_mat <- _____(3)`

6. `addition <- mat1 _____ mat2`

7. `subtraction <- mat1 _____ mat2`

8. `multiplication <- mat1 _____ t(mat2)`

[8]



A = [1, 2, 3]

[4, 5, 6]

[7, 8, 9]

B = [9, 8, 7]

[6, 5, 4]

[3, 2, 1]

(c) Given two 3x3 matrices A and B:

9. Create a new matrix C by horizontally concatenating A and B.
10. Extract the first row and third column of C and calculate their sum.
11. Replace the diagonal elements of A with the diagonal elements of the 3x3 identity matrix.
12. Calculate the transpose of the modified A.
13. Perform element-wise addition and subtraction of A and B, and then multiply the resulting matrices.
14. Invert the resulting matrix from the previous step, if possible.
15. Create a 3x3x2 multidimensional array using A and B as the first and second slices, respectively.
16. Extract the element in the first row, second column, and second slice of the multidimensional array.

[8]

(d) Explain the following terms with examples in the context of R language:

- a) Matching
- b) Factors
- c) Identifying Categories
- d) Defining and Ordering Levels
- e) Combining and Cutting

Provide a brief explanation for each term and illustrate its usage with an example in the field of R language.

[8]

1 2 3 3 6 9 7 9 1

1 2 3  
3 6 9

2 9  
1 2