

# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



M.Sc. DEGREE EXAMINATION – MATHEMATICS

THIRD SEMESTER – NOVEMBER 2018

16/17PMT3ID01 – MATHEMATICAL COMPUTING USING R AND MATLAB

Date: 23-10-2018

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

## Answer ALL Questions:

1. (a) Write a R code to generate 5000 observation between 100 and 500 and, hence construct histogram and boxplot for the generated data using layout to display diagrams

OR

(b) Name any five windows which are available in R platform. (5)

(c) Write the R code to generate 10 X 10 matrix using runif statement. Select any two sub matrix of order 6 X 6 for Matrix A and Matrix B. Calculate  $AB^{-1}$ ,  $BA^{-1}$ ,  $(AB)^{-1}$  and  $(BA)^{-1}$

OR

(d) Explain different kinds of merging dataset with suitable example in R language. (15)

2. (a) Explain mathematical operators in R Language with suitable examples.

OR

(b) Describe how to import dataset from CSV and Text file into R platform. (5)

(c) Generate dataset to construct simple bar chart and pie chart. Also write R code to construct simple bar diagram and pie diagram with specifying colours, x axis, y axis label and title of the chart.

OR

(d) Explain the following statements in R with suitable example. (15)

“prompt”, “rm”, “ls()”, “seq()”, “rep()”, “attach”, “detach”, “subset”

3. (a) Explain the procedures for one sample t test.

OR

(b) What are the logical and relational operators in R Language? Explain with suitable examples. (5)

(c) Explain different types of relationship between two variables based on correlation value. Also explain chi-square test with suitable example.

OR

(d) Explain Wilcoxon Signed Rank sum test and Paired t test in R language with suitable examples. (15)

4. (a) Explain the uses of the following MATLAB commands: clear, colon, semicolon, who and ellipsis.

OR

(b) What are the relational operators? Explain each one with an example. (5)

(c) Write MATLAB commands to evaluate the following mathematical expressions:

(i)  $y = 5x^3 + \frac{4}{x^2}$

(ii)  $y = 7 \frac{\sin 3x}{4}$

(iii)  $y = 2x^{1/3} + 4x^{1.58}$

$$(iv) r = \frac{1}{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}}$$

$$(v) y = \sqrt{x^3 - 46x}$$

(d) Briefly explain different types of selection statements with suitable examples. (10 + 5)

OR

(e) How could one refer and modify an element or a group of elements in MATLAB? Explain the above by generating a matrix.

(f) Write a short note on output statements in MATLAB using appropriate examples. (9 + 6)

5. (a) For a matrix  $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$  compute the following:

(g) Inverse of A

(ii) Determinant of A

(iii) Trace of A

(iv) Upper triangular matrix of A

(v) Lower triangular matrix of A.

OR

(b) Write down the uses of the following MATLAB commands:

(i) clf

(ii) title

(iii) grid

(iv) legend

(v) hold

(5)

(c) Generate a multiplication table of order m x n, where m and n are positive integers.

(d) Write a description on the following MATLAB commands:

(i) poly2sym

(ii) polyfit

(iii) subs

(iv) subplot

(v) tic/toc

(vi) expand

(e) Compute the following MATLAB commands (i)  $\frac{d^2}{dx^2}(\cos 2x)$  (ii)  $\int \tan x dx$  (iii)

$$\int_1^4 \int_2^4 (x^2 + y^2) dx dy.$$

(8 + 6 + 3)

OR

(f) Write a short note on various 2D and 3D plots in MATLAB.

(g) Explain the method to change the plot colour, line styles, and data markers using a variable.

(5)

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