LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc.DEGREE EXAMINATION – **MATHEMATICS**

THIRDSEMESTER – APRIL 2018

16PMT3ID01- MATHEMATICAL COMPUTING USING R AND MATLAB

Date: 21-04-2018
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

Answer ALL Questions. Each question caries equal marks.

1. (a) Explain the R command seq and rep.

    OR

    (b) Write the R code to generate 5 X 5 matrix. (5)

    (c) Explain the following R statements:
        i.   cbind.
        ii. rbind.
        iii. For loop statement.

    OR

    (d) How to create a new variable in the existing table using mathematical operators and conditional operators? (15)

2. (a) What is subset in R Language? Give an example.

    OR

    (b) Test whether the given vectors are linearly dependent

$$v_1 = \begin{pmatrix} 1 \\ 5 \\ 6 \\ 4 \end{pmatrix} \quad v_2 = \begin{pmatrix} 8 \\ 2 \\ 8 \\ 7 \end{pmatrix} \quad v_3 = \begin{pmatrix} 9 \\ 7 \\ 5 \\ 5 \end{pmatrix} \quad v_4 = \begin{pmatrix} 7 \\ 2 \\ 5 \\ 5 \end{pmatrix}.$$

    (5)

    (c) Describe Kruskal Wallis test in R Language.

    OR

    (d) Construct a table with random values for the variables name, marks in mathematics, marks in statistics and marks in physics. Also construct multiple bar diagram for the generated data in R language. (15)

3. (a) Determine the Rank of the Given Matrix.

$$A = \begin{bmatrix} 1 & 2 & 5 & 5 & 4 \\ 5 & 10 & 45 & 2 & 9 \\ 6 & 12 & 7 & 4 & 6 \\ 4 & 8 & 84 & 6 & 8 \\ 8 & 16 & 5 & 8 & 10 \end{bmatrix}.$$

    OR

    (b) Explain one sample t test in R. (5)

(c) What is correlation? Explain different types of correlation based on correlation value.

OR

(d) The following data represent the employee's details:

Emp_ID	Emp_Name	Gender	Occupation	Income
001	Robert	Male	Professor	40000
002	Yokitha	Female	Defense	100000
003	Sangeetha	Female	IAS	150000
004	Vijaykumar	Male	IPS	200000
005	Senthil	Male	Lawyer	50000

    i.   Enter the given data in R Language and convert into table format using data frame.

    ii.   Write the R Language code to calculate mean, median and standard deviation of Income.

    iii.   Write a R Language code to convert Gender Male into 1 and Female into 2.

(15)

4. (a) Describe Linspace function and Logspace functions with examples.

OR

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

(5)

(c) Briefly explain For loop and While loop with suitable examples.

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

  (i) $y = 3x^3 + \frac{5}{x^2}$ (ii) $y = \frac{\sin 3x}{5}$ (iii) $y = 3x^{1.58} + \frac{1}{x^{0.36}}$ (iv) $r = \frac{1}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}+\frac{1}{d}}$ (v) $y = \sqrt{x^3 + 2x}$.

(5 + 10)

OR

(e) Write a short note on output statements in MATLAB using appropriate examples.

(f) Write a script file to calculate the area of (i) the circle   (ii) triangle   (iii) rectangle.

(6 + 9)

5. (a) Write down the uses of the following MATLAB commands:

    (i) grid   (ii) clf   (iii) hold   (iv) legend   (v) title

OR

(b) Given a system Ax=b where $A = \begin{pmatrix} 8 & 2 \\ 4 & 3 \end{pmatrix}, x = \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}, b = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$, write the MATLAB commands to compute the following:

    i)   rank of A.

    ii)   trace of A.

    iii)   determinant of A.

    iv)   inverse of A.

    v)   upper triangular matrix of A.

(5)

(c) Explain the method to change the plot colour, line styles, and data markers.

(d) Write the description for the following commands:

   i) polyval   ii) hist(y)   iii) bar(x,y)   iv) tic/toc   v) if else statement   (10 +5)

OR

(e) Write a script that plots sin x and cos x in the same figure window for the values of x ranging from 0 to 2 π.

(f) Compute the following MATLAB commands (i) $\frac{d^2}{dx^2}(\sin 2x)$ (ii) $\int \cos x \, dx$ (iii) $\int_0^5 \int_0^3 (x^2 + y^2) dx dy$.

(9 + 6)

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