LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2022**

PMT 3301 – MATHEMATICAL COMPUTING USING R AND MATLAB

Date: 30-11-2022   Dept. No.   Max. : 100 Marks
Time: 09:00 AM - 12:00 NOON

Answer ALL Questions:

1. (a) Explain various types of Windows in R Language.
OR
   (b) Demonstrate for…loop statement and while … loop statement in R Language.   **(5)**

   (c) (i) Generate 5X5 matrices for A and B and hence prove $AA^{-1}=I$ and $BB^{-1}=I$ in R Language.
       (ii) Explain inner join, outer join, left join and right join in R Language.   **(7 + 8)**
OR
   (d) (i) What are assumption are used to check the normality in parametric tests.
       (ii) Explain the testing procedure for one sample t-test for your own dataset in R Language.
                                                                                    (7 + 8)

2. (a) How do you import csv file and excel file to R Language with suitable example.
OR
   (b) Explain cbind and rbind in R Language with suitable example.   **(5)**

   (c) (i) Generate your own dataset to construct pie chart in R language with displaying values and labels on the slices.
       (ii) Write a testing procedure for Mann-Whitney U test in R Language.   **(8 + 7)**
OR
   (d) What are the differences between two sample independent t-test and ANOVA. Also write a testing procedure for two sample independent t-test in R Language.   **(15)**

3. (a) How do you interpret slope and intercept in Regression model.
OR
   (b) When do you use Binary logistic regression model and give a real time example.   **(5)**

   (c) Explain various interpretation of correlation coefficient based on the correlation value.

                                                                                    (15)

OR
   (d) (i) Test whether the given vectors are linearly dependent

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

       (ii) Explain multiple regression model with suitable example.   **(7 + 8)**

4. (a) Describe MATLAB desktop environment and mention its uses.
OR
   (b) What do the MATLAB commands clc, clear, semicolon, whos, and ellipsis do?   **(5)**

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

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(d) Explain the three basic different operations or modes on files in MATLAB with appropriate examples.

(8 + 7)

OR

(e) Write a short note on outputs statements in MATLAB.

(f) Describe the different types of selection statements in MATLAB. **(5 + 10)**

5. (a) Write down the uses of the following MATLAB commands:
   (i) subplot   (ii) legend   (iii) semilogx (iv) grid   (v) ylabel

OR

(b) Mention few 'is' functions used in MATLAB and explain it with examples. **(5)**

(c) Write down the description for the following commands:
   i) surf   ii) bar(x,y)   iii) pie3   iv) comet3   v) meshgrid

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

(5 +10)

OR

(e) Given a system Ax=b, where $A = \begin{bmatrix} 3 & -4 \\ 6 & -10 \end{bmatrix}, x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}, b = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$, write the equivalent MATLAB commands for the following:
   i)   rank of A
   ii)   upper triangular matrix of A
   iii)   trace of A
   iv)   determinant of A
   v)   inverse of A

(f) Explain the following functions that work on mathematical expressions in MATLAB:
   i) collect   ii) simplify   iii) expand   iv) polyder   v) factor   vi) sym2poly
   vii) polyfit

(g) Compute the following using MATLAB commands: (i) $\frac{d^2}{dx^2}(\tan 3x)$ (ii) $\int e^x dx$

   (iii) $\int_0^7 \int_0^2 (x + 4y) dx dy$. **(5 + 7 + 3)**

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