# LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2024**

**PMT3ID01 – MATHEMATICAL COMPUTING USING MATLAB AND R**

Date: 16-11-2024 Dept. No. Max. : 100 Marks

Time: 01:00 pm-04:00 pm

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| | **SECTION A – K1 (CO1)** |
| | **Answer ALL the questions** **(5 x 1 = 5)** |
| **1** | **Answer the following** |
| a) | Write the syntax to export file in R. |
| b) | What is the use of View function in R? |
| c) | State the use of clc command in MATLAB. |
| d) | Define extrapolation. |
| e) | Write the equivalent MATLAB command for the expression $\int_0^1 \int_0^1 (x^2+y^2)\,dydx$. |
| | **SECTION A – K2 (CO1)** |
| | **Answer ALL the questions** **(5 x 1 = 5)** |
| 2 | **MCQ** |
| a) | Which of this command is incorrect?<br>(i) c(TRUE, FALSE, FALSE, TRUE)<br>(ii) c("TRUE", "FALSE", "FALSE", "FALSE")<br>(iii) c(23, 20, 12, 18)<br>(iv) c(Male, Female, Male, Female) |
| b) | The graphical argument that is used in R to adjust the size of text or symbols within the graph is _____.<br>(i) pch()<br>(ii) cex()<br>(iii) lim()<br>(iv) type() |
| c) | > mynum = 3<br>>> mynum = 4 + 2<br>>> mynum = mynum + 1<br>>> mynum + 3<br>The value of stored in the variable mynum is<br>(i) 6<br>(ii) 10<br>(iii) 7<br>(iv) 3 |
| d) | If a variable has the dimension 3 x 4, could it be considered to be<br>(i) scalar<br>(ii) row vector |

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| | (iii) column vector<br>(iv) matrix |

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| e) | Which command can be used to generate multiple graphs in the same window?<br>(i) hold on<br>(ii) grid on<br>(iii) axis on<br>(iv) legend on |

**SECTION B – K3 (CO2)**

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| | **Answer any THREE of the following** | **(3 x 10 = 30)** |
| 3 | Explain Graphical and data editor windows in R. | |
| 4 | Write the uses of the following functions with an illustration:<br>(i) prop.table() (ii) seq() (iii) merge() (iv) plot() (v) table() | |
| 5 | a. Write a short note on variables and assignment statements in MATLAB. (5 + 5)<br>b. Write MATLAB commands to evaluate the following mathematical expressions:<br>i. $y=(1+x)^{-1}$<br>ii. $\frac{1}{e^2}+\frac{1}{e_1^2}=1$<br>iii. $y=x^{0.12}+\frac{1}{5x^{0.39}}$<br>iv. $r=\frac{1}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}+\frac{1}{d}}$<br>v. $y=\sqrt{x^4-7x}$ | |
| 6 | How could one refer and modify an element or a group of elements in MATLAB? Make use of a matrix to explain. | |
| 7 | Write down the description for the following commands:<br>i) bar3 ii) plot3 iii) pie3 iv) surf v) comet3 | |

**SECTION C – K4 (CO3)**

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| | **Answer any TWO of the following** | **(2 x 12.5 = 25)** |
| 8 | Write the functions to get the measures of central tendency and dispersion. | |
| 9 | Explain the types of correlations with example. | |
| 10 | Examine and describe the various classes(types) associated with variables and briefly explain type casting using an example. | |
| 11 | a. Given a system Ax=b, where $A=\begin{bmatrix}9&8&7\\6&5&4\\3&2&1\end{bmatrix}, x=\begin{bmatrix}x_1\\x_2\\x_3\end{bmatrix}, b=\begin{bmatrix}5\\7\\4\end{bmatrix}$, write the equivalent MATLAB commands for the following:<br>i. rank of A<br>ii. upper triangular matrix of A<br>iii. trace of A<br>iv. determinant of A<br>v. inverse of A<br>b. Provide an illustration to explain the following MATLAB commands: (5 + 7.5)<br>i. zeros | |

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| | ii. end<br>iii. rand<br>iv. rot90<br>v. repmat<br>vi. sign<br>vii. cumprod<br>viii. cross |

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| | **SECTION D – K5 (CO4)** | |
| | **Answer any ONE of the following** | **(1 x 15 = 15)** |
| 12 | a. Explain logical and relational operators in R with examples.<br>b. Illustrate the data structure "list" available in R. | (10+5) |
| 13 | a. Explain the functions linspace and logspace in MATLAB.<br>b. Briefly describe the selection statements using appropriate examples. | (5 + 10) |
| | **SECTION E – K6 (CO5)** | |
| | **Answer any ONE of the following** | **(1 x 20 = 20)** |
| 14 | Explain in detail the various univariate and bivariate graphs with illustration. | |
| 15 | a. Construct a best fit curve for the following set of data using the polyfit function and mention the nearest polynomial. | |

| x | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| y | 1.0 | -0.6242 | -1.4707 | 3.2406 | -0.7366 | -6.3717 |

b. Discuss the process of modifying the plot color, line styles and data markers, when you assign the plotted figure to a variable. (10 +10)

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