LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **MATHEMATICS**

FIFTH SEMESTER – **NOVEMBER 2024**

UMT 5504 – MATHEMATICAL TOOLS FOR ANALYTICS

Date: 18-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

Section-A

Answer ANY FOUR of the following $(4 \times 10 = 40)$

1 a) Write the rules to be followed to define a variable in MATLAB.
b) Explain the following with an example.
i) Adding elements to a vector.
ii) Adding elements to a matrix.
iii) Deleting elements. (5+5)

2 a) Differentiate between rand, randi and randn commands in MATLAB.
b) Write short notes on predefined variables and key words in MATLAB. (6+4)

3 Explain the three different ways in which the values can be assigned to a variable in a script file in MATLAB.

4 What are the different types of output functions in MATLAB? Explain each with an example.

5 Explain the various relational and logical operators in MATLAB with examples.

6 a) Explain the structure of the function file.
b) Write the similarities and the difference between the script and function file. (5+5)

7 a) Define anonymous function. Give one example.
b) Explain nested function with an example. (4+6)

8 a) How will you create symbolic objects and symbolic expression. Write the syntax and give one example.
b) Write the commands to do symbolic integration and differentiation and give one example for each. (4+6)

Section-B

Answer ANY THREE of the following $(3 \times 20 = 60)$

9 a) Write the use of the following commands, where A is an $m \times n$ matrix.
i) A(:,n)
ii) A(n,;)
iii) A(:,m:n)
iv) A(m:n:)
v) A(m:n,p:q)
b) Explain the following:
i) Creating a vector from a known list of numbers.
ii) Creating a vector with constant spacing by specifying the first term, then spacing and the last term.
iii) Creating a vector with linear (equal) spacing by specifying the first and the last term, and the list of numbers. (10+10)

10 a) Explain the following with a flow chart
i) for-end loop. ii) while-end loop

b) Explain the various commands used in formatting a plot in MATLAB. (10+10)

11 a) Draw the structure of the switch case statement and explain how it works.

b) Write a script file that plot the function $3x^3-26x+10$, and its first and second derivatives, for $-2 \le x \le 4$, all in the same plot. (12+8)

12 a) Explain how will you perform the following in MATLAB.

i) Expressing polynomials.
ii) Finding the value of the polynomial.
iii) Finding the roots of a polynomial.
iv) Multiplying two polynomials.
v) Dividing two polynomials.

b) Define interpolation and explain how One-dimensional interpolation is done in MATLAAB. (10+10)

13 a) Write the steps involved in creating the surface and mesh plots in cartesian and polar coordinates.

b) Write a script file to create mesh and surface plot for the following function $z=1.8^{-1.5\sqrt{x^2+y^2}}$ over the domain $-3 \le x \le 3$ and $-3 \le y \le 3$. (12+8)

14 a) Explain the following MATLAB commands with examples.

i) collect ii) expand iii) factor iv) simplify v) pretty

b) What are structures? How to create and modify them in MATLAB? (15+5)

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