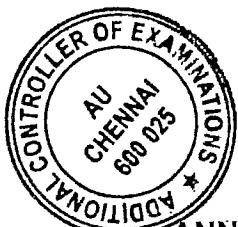RollNo.

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech(Full Time) - END SEMESTER EXAMINATIONS, Nov / Dec 2024

GEOINFORMATICS

Semester VII

GI5703 MATLAB PROGRAMMING AND APPLICATIONS

(Regulation2019)

Time:3hrs   Max.Marks: 100

CO1	To enable the student to understand basic MATLAB functions
CO2	To enable to solve mathematical problems related to differentiation and integration
CO3	To enable to solve problems related to Liner and Non Linear equations to correct the same to geospatial algorithms
CO4	To enable to solve transformations of geospatial problems
CO5	To make to develop skills in geospatial tool box and map making

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No	Questions	Marks	CO	BL
1	Write a MATLAB command to calculate the element by element multiplication of two vectors, A=[2,5,3] and B=[6,5,7]	2	1	2
2	What are the key differences between truncation errors and round-off errors in numerical methods?	2	1	2
3	Differentiate the explicit and implicit Euler methods for solving ordinary differential equations (ODEs).	2	2	2
4	How would you use MATLAB's trapz function to compute the integral of the vector y=[1,4,9,16] with x=[1,2,3,4]?	2	2	3
5	What is the significance of partial pivoting in LU decomposition?	2	3	2
6	Using MATLAB's fzero function, find a root of the function $f(x)=x^2-5x+6$ near x=2.	2	3	3
7	Compare the use of the Laplace transform and the Fourier transform in solving differential equations.	2	4	3
8	Use MATLAB's integral function to compute the definite integral of $f(x)=e^{-x^2}$ over the interval [0, 1]	2	4	3
9	Write the importance of subplot functionality in MATLAB for data visualization	2	5	1
10	How you can customize graph elements such as color, labels, and titles in MATLAB.	2	5	3

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No	Questions	Marks	CO	BL
11 (a)	Explain the importance of array operations in MATLAB with examples. Also discuss how array operations differ from looping constructs in terms of efficiency.	13	1	2
OR				
11 (b)	Discuss the role of scripts and functions in MATLAB programming. Using the MATLAB function, create the script to calculate factorial of numbers 1 to 100.	13	1	2
12 (a)	Using MATLAB, write a script to compute the first derivative of the function $f(x)=\sin(x)$ at $x=\pi/4$ using Newton cotes formulas with h=0.1.	13	2	4
OR				
12 (b)	Write a MATLAB program to solve the ODE $y'=x+y$ with $y(0)=1$ over x=[0,1] using step sizes h=0.1 and h=0.05. Compare the numerical solution with the exact solution and analyze the error as h decreases.	13	2	4
13 (a)	Using MATLAB, solve the system of equations using both Gaussian Elimination and LU Decomposition methods.: $2x+y-z =8$, $-3x-y+2z =-11$, $-2x+y+2z =-3$ Analyze the results and discuss when LU decomposition is preferred.	13	3	4
OR				
13 (b)	Using MATLAB solve the following system by Newton-Raphson method: $f1(x,y)=x^2+y^2-4$, $f2(x,y)=e^x+y-1$. Analyze the importance of providing a good initial guess in multi-variable nonlinear solvers.	13	3	4
14 (a) (i)	Solve the quadratic equation $x^2-5x+6=0$ using MATLAB's roots function.	6	4	3
(ii)	(1) Compute the Laplace transform of $f(t)=t^2e^{-3t}$ (2) Find the inverse Laplace transform of $F(s)=s / s^2+9$.	3 4	4	3
OR				
14 (b) (i)	Use MATLAB to solve the differential equation $(dy / dx) +2y=e^{-x}$ with the initial condition y(0)=1.	6	4	3
(ii)	Using MATLAB, derive the slope map of a terrain model represented by a 3x3 grid: Z=[10 12 14 8 11 13 6 9 12]. Compute the slope for each cell using the differences between adjacent grid points.	7	4	3

15 (a)	(i)	Summarize the capabilities of MATLAB's Geospatial Toolbox.	13	5	2
	(ii)	Describe how to add multiple plots on the same figure using subplots.			
OR					
15 (b)	(i)	Differentiate between bar charts and 3D plots in MATLAB and explain their use cases.	13	5	2
	(ii)	Explain the significance of visualizing data using Bar Charts and 3D Plots.			

PART- C(1 x 15=15Marks)
(Q.No.16 is compulsory)

Q.No	Questions	Marks	CO	BL
16.	Create an integrated watershed and landslide vulnerability mapping model using MATLAB's Geospatial Toolbox. The model should assess terrain dynamics and identify high-risk areas for landslides based on terrain features and hydrological data.	15	4	6