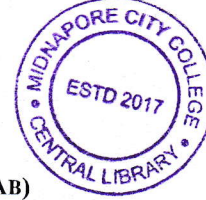


PG (CBCS)
M.Sc. Semester-I Examination, 2023
APPLIED MATHEMATICS
PAPER: MTM 197 (PRCATICAL)
(COMPUTATIONAL METHODS: USING MATLAB)

**Full Marks: 25****Time: 2 Hours**

The figures in the right-hand margin indicate full marks.
 Candidates are required to give their answers in their own words as far as practicable.

ANSWER ONE QUESTION FROM EACH GROUP**GROUP-A****1 × 12**

- 1) Write a function program in MATLAB to find all Armstrong numbers between two specified numbers.
- 2) Write a script program in MATLAB to test three specified numbers are in A.P. or not.
- 3) Write a program that converts a temperature given in Celsius to its equivalent temperature in Fahrenheit.
- 4) Write a script in MATLAB to find the mean, median, variance and standard deviation for a set of discrete data.
- 5) Write a script program in MATLAB to find the signature of permutation.
- 6) Write a program in MATLAB to find the area of a triangle. Use this program to find the area of triangle whose vertices are (0,5), (0,0), (-5,0).
- 7) Write a user defined function in MATLAB to generate Fibonacci sequence. Use this function; write a script to find the Fibonacci numbers between two specified numbers.
- 8) Write a script program in MATLAB to display all primes numbers between two specified numbers.
- 9) Write a script file to compute the sum of the first n terms in the series $2k^3 + 5k, k = 1, 2, 3, \dots, n$.
- 10) Write a script program to find all palindrome numbers between two specified numbers.
- 11) Write a user defined function in MATLAB to calculate the sum of a list of numbers. Using it, find the sum of all natural numbers between two specified numbers.
- 12) Write a script in MATLAB to create a real matrix and find it eigenvalues and eigen vectors.

[P.T.O]



- 13) For a given square matrix of order 5, write a script program to carry out of the following:
- sort each column and store the result in an array B.
 - sort each row and store the result in an array C.
 - add each column and store the result in an array D.
 - add each row and store the result in an array E.
- 14) Write a script in MATLAB to create two lists of numbers and perform the following arithmetic operations on it (i) addition (ii) subtraction (iii) element-wise multiplication (iv) element-wise division.
- 15) Write a script in MATLAB to create a list of numbers and perform the following operations on it (i) find maximum (ii) calculate summation (iii) sort descending order (iv) find norm.

GROUP-B

1 × 8

- Write a script program in MATLAB to solve the following ODE and find the value of $f(1)$ using Runge-Kutta method $\frac{dy}{dx} = y - x^2 + 1, y(0) = 0.5$.
- Write a MATLAB function program to find a real root of the equation $x^2 - \sin 2x - 1 = 0$ by Newton-Raphson's method.
- Write a script in MATLAB to find an invertible matrix P and a diagonal D such that $PDP^{-1} = A$, then compare A^5 and PD^5P^{-1} .
- Write a user defined function in MATLAB to determine the roots of a quadratic equation. Use this function; write a script find the roots of the equation $x^2 + 5x + 6 = 0$.
- Write a script program in MATLAB to solve the following ODE and find the values of $f(0.1)$ and $f(0.2)$ using Euler method $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$.
- Write a user define function to find the value of $\int_a^b f(x)dx$ by Simpson 1/3's rule. Use this function; write a script program to find the value of the following integration $\int_0^1 x^2 + x dx$
- Write a script in MATLAB to represent the graphs of the functions $x^2 + y^2 = 1$.
- Write a script program to create a mesh, surface and contour plots of the function $z = e^{x+iy}$ in the interval $-1 < x < 1$ and $-2\pi < y < 2\pi$. In each case plot the real part of z versus x and y .

/P.T.O/

(2)



- 9) Write a script in MATLAB to represent the graphs in the same window of the functions $\sin x, \sin 2x$ and $\sin 3x$ in the range $(0, 2\pi)$ with mentions different line specification, title, axes and axes limits
- 10) Write a script in MATLAB to find the solution of the following linear equations
- $$\begin{aligned} 2x + y - 3z &= 11 \\ 4x - 2y + 3z &= 8 \\ -2x + 2y - z &= -6 \end{aligned}$$
- 11) Write a script program to find either minimum or maximum or sum according to your response of the function $y = x \sin x$ in the range $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ with spacing 0.2 using switch statement.
- 12) Write a user define function to find the value of $\int_a^b f(x)dx$ by Simpson 1/3's rule. Use this function; write a script program to find the value of the following integration $\int_0^1 (x^2 + x) dx$
- 13) For a diagonalizable matrix A , write a function program that returns true if A is positive definite and false otherwise. Also, write a script program to illustrate it.
- 14) Write a script program to solve the following linear equations
- $$\begin{aligned} 3x + 5y - 6z &= 6 \\ 8x - y + 2z &= 1 \\ 5x - 6y - 4z &= -5 \end{aligned}$$
- using rref, pinv, and left division methods.
- 15) Write a script program that converts a decimal number to its binary, octal and hexadecimal form.



(3)