PG (CBCS)

M.Sc. Semester-I Examination, 2022 MATHEMATICS

PAPER: MTM 197 (PRACTICAL)

PAPER. MIM 197 (PRACTICAL)

(COMPUTATIONAL METHODS: USING MATLAB)

Full Marks: 25



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 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.
- 3) Write a MATLAB function program to find a real root of the equation $x^2 \sin 2x 1 = 0$ by Newton-Raphson's method.
- 4) Write a script in MATLAB to find the mean, median, variance and standard deviation for a set of discrete data.
- 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 PA^5P^{-1} .
- 6) 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.
- 7) Write a script in MATLAB to represent the graphs in the same window of the functions sinx, sin2x and sin3x in the range $(0, 2\pi)$ with mentions different line specification, title, axes and axes limits.
- 8) 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 $x^2 + 5x + 6 = 0$
- 9) 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 $\int_0^1 x^2 + x dx$.
- 10) 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.

P.T.O.

- 12) Write a user defined function in MATLAB to calculate the roots of a general quadratic equation. Using it, find the roots of the equation $x^2 + 5x + 6 = 0$.
- 13) For a given square matrix of order 5, write a script program to carry out of the following:
- (i) sort each column and store the result in an array B.
- (ii) sort each row and store the result in an array C.
- (iii) add each column and store the result in an array D.
- (iv) add each row and store the result in an array E.
- 14) 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.
- 15) Write a script program that converts a decimal number to its binary, octal and hexadecimal form.

Group-B

1 ×

- 1) Write a script file to compute the sum of the first n terms in the series $5k^2 k$, k = 1, 2, 3, ..., n.
- Write a script program in MATLAB to display all primes numbers between two specified numbers.
- Write a script program to find all palindrome numbers between two specified numbers.
- 4) Write a script program to find the value of $\int_a^b f(x) dx$ by Trapezoidal Rule.
- 5) Write a script in MATLAB to represent the graphs of the functions $x(t) = e^{-0.2t}\cos 2t$ and $y(t) = e^{-0.2t}\sin 2t$. The text of each equation is properly positioned within the graphs.
- 6) Write a script in MATLAB to draw the surface and contour of the equation $z(x, y) = xe^{-x^2-y^2}$ in the range $-2 \le x \le 2$ and $-3 \le y \le 3$ in steps of 0.1.
- 7) Write a script in MATLAB to find the solution of the following linear equations

$$2x + y - 3z = 11$$
$$4x - 2y + 3z = 8$$

$$-2x + 2y - z = -6$$

8) Write a program in MATLAB to convert among decimal, binary, octal, Hexadecimal based on your inputs.

ESTD 2017

P.T.O.

 \Im

Write a script in MATLAB to draw the Pie diagram of a M.Sc. 1st Semester student of the following marks 35, 42, 45, 36, 38, 15

9)

- 10) 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.
- 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 $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$ with spacing 0.2 using switch statement.
- 12) Write a script in MATLAB to draw the mesh and surface with contour of the equation $z = xe^{-x^2-y^2}$ in the range $-3 \le x \le 3$ and $-3 \le y \le 3$.
- 13) Write a script in MATLAB to draw the following function in the interval [-1, $\frac{x^2+1}{1} = 1 < x < 0$

$$f(x) = \begin{cases} x^2 + 1, & -1 \le x < 0 \\ 0, & x = 0 \\ x^3 + 2x + 5, & x > 0 \end{cases}$$

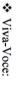
14) Write a script program to solve the following linear equations

$$3x + 5y - 6z = 6$$
$$8x - y + 2z = 1$$

5x - 6y - 4z = -5 using rref, pinv, and left divison methods.

15)

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.





S
