

PG CBCS
M.Sc. Semester-I Examination, 2020
MATHEMATICS
PAPER: MTM 197
 (COMPUTATIONAL METHODS: USING MATLAB)

Full Marks: 25

Time: 2 Hours

Answer any one question:

15X1=15

1. Write a user defined function in MATLAB to check whether a number is prime or not. Use this function; write a script to generate all prime numbers between two specified numbers.
2. Write a user defined function in MATLAB to find the value of $\int_a^b f(x)dx$ by Simpson's 1/3 rule. Use this function; write a script to find the value of $\int_0^1 x^2 dx$.
3. Write a user define function in MATLAB to find the real root of the equation $f(x) = 0$ by Newton-Raphson. Use this function; write a script to find the real root of $x^3 + x - 5 = 0$.
4. Write a script in MATLAB to draw the following function in the interval $[-1,4]$

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

with mention title, axes and axes limits.

5. 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 $\sin x$, $\sin 2x$ and $\sin 3x$ 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 $x^2 + 5x + 6 = 0$.

(P. T. O)

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Group-B**Answer any one question:****10X1=10**

9. Write a script in MATLAB to create two vectors having same number of elements by two different methods. Then, perform the algebraic operations on these vectors.
10. Write a script in MATLAB to create two matrices from a given matrix such that one matrix contains all the odd rows and another matrix contains all the even rows.
11. Write a script in MATLAB to find the two solutions of the following linear equations

$$\begin{aligned}x + 2y + 3z &= 7 \\x + y + 4z &= 8\end{aligned}$$

12. Write a script in MATLAB to draw the surface and contour of the equation $z = x^2 + y^2$ in the range $-3 \leq x \leq 3$ and $-3 \leq y \leq 3$.
13. Write a script in MATLAB to sort the rows and columns of a given matrix. Then, find the maximum element (without library function) of each row and each column of the given matrix.
14. Write a script in MATLAB to find the solution of the following linear equations

$$\begin{aligned}-x + y &= 2 \\5x + y &= 18 \\-6x + 4y &= 20\end{aligned}$$

15. Write a program in MATLAB to convert among decimal, binary, octal, Hexadecimal based on your inputs.
16. Write a script in MATLAB to represent the graphs of the functions $y = \sin x^2$ and $y = \log \sqrt{x}$. The text of each equation is properly positioned within the graphs.