

PG (NEW) CBCS
M.Sc. Semester-I Examination, 2019
MATHEMATICS
PAPER: MTM-197
(Computational Methods: Using MATLAB)

Full Marks: 50**Time: 3 Hours**

Answer any one question in MATLAB from each group on lottery basis.
(LNB: 5, Experiment: 20)

Group A

Select one question in Lottery basis. (6 × 1 = 6)

1. Write a script in MATLAB to find the sum and the product of all prime factors of a given number.
2. 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.
3. Write a script in MATLAB to create two different matrices and perform the algebraic operations on these matrices if possible.
4. 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.
5. 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.
6. Write a user defined function in MATLAB to determine the roots of a quadratic equation. Using this function find the roots of the equation $x^2 + 5x + 6 = 0$.
7. Write a user defined function in MATLAB to generate Fibonacci sequence. Using this function find the Fibonacci numbers between two specified numbers.
8. Write a script in MATLAB to find the two solutions of the following linear equations
 $x + 2y + 3z = 7$
 $x + y + 4z = 8$
9. Write a script in MATLAB to find the solution of the following linear equations
 $-x + y = 2$
 $5x + y = 18$
 $-6x + 4y = 20$
10. 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} .

Group B**Select one question in Lottery basis. (8× 1 = 8)**

1. Write a user defined function in MATLAB to find the real root of the equation $f(x) = 0$ by Newton-Raphson method and using this find a real root of the equation $x^3 + 2x - 5 = 0$.
2. Write a user defined function in MATLAB to find the real root of the equation $f(x) = 0$ by bisection method and using this find a real root of the equation $x^3 + 2x - 5 = 0$.
3. Write a user defined function in MATLAB to calculate correlation coefficient of two set of numbers and using this find the correlation coefficient of the following sets numbers: { 7, 8, 9, 6, 3, 9, 8, 5, 7, 11 } and { 5, 6, 7, 1, 7, 6, 3, 5, 9, 10 }.
4. Write a user defined function in MATLAB to find the value of $\int_a^b f(x)dx$ by Trapezoidal rule and using this find the value of the integral $\int_0^1 x dx$ by dividing 100 sub-intervals.
5. Write a user defined function in MATLAB to find the value of $\int_a^b f(x)$ by Simpson 1/3's rule and using this find the value of the integral $\int_0^1 x^2 dx$ by dividing 100 sub-intervals.
6. Write a user defined function in MATLAB to find the standard deviation of the sample: 7, 8, 9, 6, 3, 9, 8, 5, 7, 11.
7. Write a user defined function in MATLAB to find the standard deviation of the sample: 7, 8, 9, 6, 3, 9, 8, 5, 7, 11.
8. Write a user defined function in MATLAB that return true if A is positive definite and false otherwise for any diagonalizable matrix A.
9. Write a program in MATLAB to convert among decimal, binary, octal, Hexadecimal based on your inputs.
10. Write a user defined function in MATLAB to find the factorial of positive integer n. Hence computer n_{Cr} .

Group C

Select one question in Lottery basis. (6× 1 = 6)

1. Write a script in MATLAB to represent the graphs of the functions $\sin x$, $\sin 2x$ and $\sin 3x$ in the range $(0, 2\pi)$ for x , all on the same axes and different line specification.
2. Write a script in MATLAB to draw $\sin t$ and $\cos t$ in the interval $[0, 4\pi]$ in the same figure with different line specification.
3. 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 graph.
4. Write a script in MATLAB to draw following parametric equations $x = \sin t$ and $y = \cos t$ in the interval $[0, 2\pi]$.
5. Write a script in MATLAB to draw $y = |x|$ in the interval $[-4, 4]$ with mentions title, axes and axes limits.
6. Write a script in MATLAB to draw the following function in the interval $[-1, 4]$

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

7. Write a script in MATLAB to represent the graph of the curve whose equation in polar coordinates is as follows: $r = \sin 2t$ for t between 0 and 2π .
8. Write a script in MATLAB to draw the surface of the equation $z = x^2 + y^2$ in the range $-3 \leq x \leq 3$ and $-3 \leq y \leq 3$.
9. Write a script in MATLAB to draw the surface of the equation $z = xe^{-x^2-y^2}$ in the range $-3 \leq x \leq 3$ and $-3 \leq y \leq 3$.
10. Write a script in MATLAB to draw the contour of the equation $z = \sin x + \cos y$ in the range $-2\pi \leq x \leq 2\pi$ and $0 \leq y \leq 4\pi$.