Name of Course	: **CBCS B.Sc. (Math Sci)-II, B.Sc. (Phy Sci)-II, B.Sc. (Life Sci)-II, B.Sc. (Industrial Chemistry)-II, B.Sc. (Analytical Chemistry)-II**
Unique Paper Code	: **42353328**
Name of Paper	: **SEC-I Computer Algebra System**
Semester	: **III**
Duration	: **2 hours**
Maximum Marks	: **38 Marks**

Attempt any four questions. All questions carry equal marks.

1. Write Mathematica command to plot the graph of the function $f(x) = x\log(\sin(1/x))$.

Define the following function in Mathematica $f(x) = \frac{x\sin(x)}{(1+x^2)}$.

Write the Mathematica command to iterate the function $f(z) = z^2 + z + c$, eight times beginning with $c = -1 + i$ and $z = -0.5 + 0.5\,i$.

2. Write Mathematica command to plot the function $y = \sin(\pi/3 + \cos(x))$, $-10 \le x \le 10$, $0 \le y \le 50$ with colour of the curve is red and width 0.08.

Use the Frame, Filling, Frame Style, Plot Range and Aspect Ratio to produce the plot of the function $y = \frac{\cos(13x)}{(1+x^3)}$.

Write the Mathematica command to plot the Step function $f(x) = x^2$, $n \le x < n+1$ with $0 \le x < 20$.

3. Explain Reduce and Solve Mathematica commands. Also give syntax to simplifying the expression $x^3 - y^3$.

Write the command for $\lim_{x \to 0} \frac{\cos x}{x}$ and $\lim_{x \to \infty} \frac{\sin x}{x}$.

Use Factor command to find the real roots of $f(x) = x^3 + 3x^2 - 3x - 1$.

4. Give the syntax for finding the first derivative and indefinite integral of the function $f(x) = x^2 + \sin x$ using Mathematica. Also mention the commands to plot these functions.

Find the Extreme value of the function $f(x) = x^3 - 27x + 4$ using Mathematica and give the syntax to plot the same.

5. Write the Mathematica command for the Constant matrix of order (3, 4) also Explain the Mathematica commands "//MatrixForm", "RandomInteger", "Table", "RowReduce", "LinearSolve".

Find the reduced row Echelon form of the Matrix $\begin{bmatrix} 1 & 2 & -5 \\ 4 & 6 & 9 \\ 5 & -7 & 2 \end{bmatrix}$ MANNUALLY by Mathematica (Write the all commands and its output).

6. Write the commands using the built-in function **Min** for function produces a matrix where each entry is the minimum of the row number and column number of that entry's position. Write an example of Matrix with Random Integer 15 of order (3, 4).

Write the Mathematica commands for ALL steps for the solution a system of linear equations

$$2x + 3y + z = 4, \quad -3x + 7y - 3z = 6, \qquad x - y + 5z = 3.$$