Name of Course : **LOCF B.Sc. (Math Sci)-II/ B.Sc. (Phy Sci)-II/ B.Sc. (Life Sci)-II/ B.Sc. (Industrial Chemistry)-II/ Analytical Chemistry-II**

Unique Paper Code : **42353328**

Name of Paper : **SEC-1 Computer Algebra System**

Semester : **III**

Duration : **3 hours**

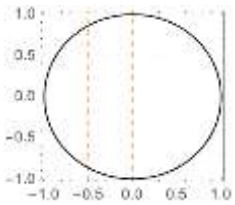
Maximum Marks : **38 Marks**

Attempt any four questions. All questions carry equal marks.

1. Plot the piecewise function

$$f(x) = \begin{cases} 2 - x & x < -1 \\ x & -1 \le x < 1 \\ (-1 + x)^2 & x \ge 1 \end{cases}$$

Plot the following graph of a circle with orange and dashed grid lines



2. For $c = -1 + 2i$ and $z = 2 + 3i$, iterate the function $f(z) = 3z + c$ five times. Manipulate the function, $f(x) = a\,x^2$ for $-2 \le x \le 2$ and $-3 \le x \le 3$ using the slider.

3. Write some similarities and differences between reduce, solve and NSolve commands. Integrate $\ln(x + 1)^m$ for integers $m = 1$ to 6, identify the pattern, and propose a general formula for

$$\int \ln(x + 1)^m \, dx$$

for any positive integer *m*.

4. Give the syntax to find the first derivative and indefinite integral of the function $x^3 + \cos x$ and plot the function using Mathematica/Maxima/Matlab/etc. Find the maximum value of the function

$$f(x) = \sin x + \frac{\sin 2x}{2} + \frac{\sin 3x}{3}, \quad \text{for all } x \in [0, \pi].$$

5. Write the syntax to obtain a matrix of order 5×5 with all the diagonal entries as 4, all entries on the sub-diagonal as 6 and all entries on the super-diagonal as 7. Find the cofactors and eigenvalues of the matrix.

6. Write a syntax to obtain 4×4 lower triangular matrix with entries on and below the diagonal equal to $i + 3ij$, and above the diagonal equal to 0. Find adjoint of the matrix.