| MTL 511 | Lab - 3 | 2 Credits (2 hours lab /week) |
|---|---|---|

**Practicals for III Semester**

**Mathematics practicals with Free and Open Source Software (FOSS) tools for computer programs**

**Course Outcome/Specific Outcome:** Students will have the knowledge and skills to implement the programmes listed below in the Scilab programming language. They can be expected to apply these programming skills of computation in science and Engineering.

1) Program to implement Least square approximation Method.

2) Program to find a real root of a polynomial using fixed point iterative Method.

3) Program to find a real root of a polynomial using Newton Raphson Method.

4) Program to find a real root of a polynomial using Secant Method.

5) Program to solve a system of equations using Gauss Elimination Method and Gauss Jordan Method.

6) Program to find the solution of a system of equations using using Jacobi Iterative Method/Gauss Seidal Method.

7) Program to find the largest eigenvalue and eigenvector of a matrix by using Power Method.

8) Program to find the smallest eigenvalue and eigenvector of a matrix using inverse power method.

9) Program to transform a given symmetric matrix to a tri-diagonal matrix using House holder's method.

10) Program to evaluate the given integral using Trapezoidal rule/ Simpson's 1/3 rule/Simpson's 3/8 rule.

11) Program to find the approximate solution of a differential equation with initial condition by Picard's method of successive approximation

12) Program to solve an initial value problem using Euler's Method/ Euler's Modified Method.

Note: The above list may be changed annually with the approval of the PG BOS in Mathematics.

**IV Semester**

| MTH 552 | Complex Analysis - II | 4 Credits (48 hours) |
|---|---|---|

**Course Outcome:** Students will have the knowledge and skills to use complex analysis techniques to get asymptotics, to be rational and get real, solve analytic combinatorics viz,. the calculus of residues, Poisson's formula, Schwarz's theorem, the reflection principle, the Fourier development, the Weierstrass $\wp$ function. Complex analysis has several applications to the study of Banach algebras in Functional analysis, Holomorphic functional calculus, and Control theory.

**Course Specific Outcome:** At the end of the course Students will have the knowledge and skills to understand, explain in depth and apply in various situations the concepts -

- Evaluation of definite integrals
- Harmonic Functions, Poisson's formula, Schwarz's theorem, The reflection principle. Power series expansions - Weierstrass's theorem, The Taylor series
- The Laurent series. Partial fractions, Infinite products
- The Gamma function, Jensen's formula, Product development of Riemann Zeta function.
- Elliptic Functions.

**Unit I - The Calculus of Residues:**
The Residue theorem, The argument principle, Evaluation of definite integrals.
Harmonic Functions: Definition and basic properties, The mean value property, Poisson's formula, Schwarz's theorem, The reflection principle.

**(12 Hours)**