COMPUTATIONAL MATHEMATICS LABORATORY

I Semester : CSE | IT | ECE | EEE
II Semester : AE | ME | CE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS102	Foundation	-	-	2	1	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 24**				**Total Classes: 24**		

OBJECTIVES:

The **course should enable the students to:**

I. Demonstrate the basic principles of MATLAB.
II. Analyze the applications of Algebra and Calculus using MATLAB software.
III. Estimate the roots of Algebraic and Transcendental equations.
IV. Evaluate the characteristics of given curves by means of plotting a graph.

COURSE LEARNING OUTCOMES (CLOs):

The students should enable to:

1. Understanding the history and features of MATLAB.
2. Solve the algebraic and transcendental equations using bisection method, method of false position and Newton-Raphson method.
3. Plotting the roots of algebraic and transcendental equations in a given range.
4. Verifying the basic properties of limits for the given functions.
5. Determining the derivatives of a given function.
6. Calculation of the area enclosed between axis, the curve and the ordinates..
7. Demonstrate knowledge of matrix calculation as an elegant and powerful mathematical language in connection with rank of a matrix, linear system of equations..
8. Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problems..
9. Solving Second and higher order differential equations.
10. Evaluate line, surface and volume integrals by expressing in other coordinate system.
11. Apply numerical methods to interpolate.
12. Apply method of least squares to fit a curve.
13. Solve the differential equation using numerical methods (Taylor's series, Euler's, Modified Euler's and Runge-Kutta methods).
14. Evaluate region is bounded between the given curves and plotting the diagram.
15. Analyze scalar and vector fields and compute the gradient, divergence and curl.

LIST OF EXPERIMENTS

Week-l	**BASIC FEATURES**

a. Features and uses.
b. Local environment setup.

Week-2	**ALGEBRA**

a. Solving basic algebraic equations.
b. Solving system of equations.
c. Two dimensional plots.

Week-3	**CALCULUS**

a. Calculating limits.
b. Solving differential equations.

c. Finding definite integral.	
Week-4	**MATRICES**
a. Addition, subtraction and multiplication of matrices. b. Transpose of a matrix. **c.** Inverse of a matrix.	
Week-5	**SYSTEM OF LINEAR EQUATIONS**
a. Rank of a matrix. b. Gauss Jordan method. c. LU decomposition method.	
Week-6	**LINEAR TRANSFORMATION**
a. Characteristic equation. b. Eigen values. c. Eigen vectors.	
Week-7	**DIFFERENTIATION AND INTEGRATION**
a. Higher order differential equations. b. Double integrals. c. Triple integrals.	
Week-8	**INTERPOLATION AND CURVE FITTING**
a. Lagrange polynomial. b. Straight line fit. c. Polynomial curve fit.	
Week-9	**ROOT FINDING**
a. Bisection method. b. Regula false method. c. Newton Raphson method.	
Week-10	**NUMERICAL DIFFERENTION AND INTEGRATION**
a. Trapezoidal, Simpson‘s method. b. Euler method. c. Runge Kutta method.	
Week-11	**3D PLOTTING**
a. Line plotting. b. Surface plotting. c. Volume plotting.	
Week-12	**VECTOR CALCULUS**
a. Gradient. b. Divergent. c. Curl.	
Text Books:	
1. Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press, Taylor and Francis Group,6th Edition, New Delhi, 2015.	
Reference Books:	
1. Cleve Moler, Numerical Computing with MATLAB, SIAM, Philadelphia, 2nd Edition, 2008.	