COMPUTATIONAL MATHEMATICS LABORATORY

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

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

I. COURSE OVERVIEW:

The aim of this course is to know about the basic principles of Engineering Mathematics and its application in MATLAB by means of software. Nowadays the principles of MATLAB find wide rangeof applications in many situations such as signal processing and communications, image and video- processing, control systems, test and measurement, computational finance and computational biology. Using MATLAB, one can analyze data, develop algorithms, and create models and applications.

II. 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 graph.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Solve** the algebraic and transcendental equations within given range range using MAT LAB programs. .	Apply
CO 2	**Utilize** MAT LAB programs for verifying properties of limits, derivatives of a function.	Apply
CO 3	**Interpret** rank, Eigen values and vectors with matrixtransformations.	Understand
CO 4	**Utilize** MAT LAB programs for solving differential equations and multiple integrals.	Apply
CO 5	**Make use of** MAT LAB programs for interpolating values of differential equations numerically.	Apply
CO 6	**Use** MAT LAB programs for vector operations on vector field.	Apply

IV. SYLLABUS:

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.

Reference Books:

1. Cleve Moler, "Numerical Computing with MATLAB", SIAM, Philadelphia, 2nd Edition, 2008.
2. Dean G. Duffy, "Advanced Engineering Mathematics with MATLAB", CRC Press, Taylor & Francis Group, 6th Edition, 2015.

Web Reference:

http://www.iare.ac.in

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS:

SOFTWARE: Microsoft Windows 7 and MATLAB – V 8.5, which is also R2015a

HARDWARE: 30 numbers of Intel Desktop Computers with 2 GB RAM