INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

NUMERICAL ANALYSIS LABORATORY								
II Semester: ST								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
BSTD24	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	0	4	2	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes: 45**		
Prerequisite: NIL								

I. COURSE OVERVIEW:

This course deals with the numerical solutions of linear and non-linear equations by using different algorithms. These includes bi section method, newton's method, method of least squares, gauss elimination method, gauss zordan method, gauss seidal method, trapezoidal rule, Simpson's rule and ranga-kutta method. This will enable the students to accostum with programming using different computer languages.

II. COURSE OBJECTIVES:

The student will try to learn:

I. The Roots of non-linear equations by Bisection method and Newton's method.
II. The system of Linear Equations using Gauss - Elimination/ Gauss - Seidal Iteration/Gauss - Jorden Method.
III. The integrations numerically using Trapezoidal and Simpson's rules

III. COURSE OUTCOMES:

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

CO 1 Analyze the roots of non-linear equation using bisection and newton's method.

CO 2 Evaluate the curve fitting by using method of least squares approximations.

CO 3 Determine the linear system of equations using Gauss elimination, Gauss Seidal and gauss Jordan methods.

CO 4 Solve the integrations numerically using trapezoidal and Simpson's rule.

CO 5 Explain the numerical solution of ordinary differential equations using Euler's Method.

CO 6 Analyze the numerical solution of ordinary differential equations by using Runge-Kutta Method.

IV. COURSE CONTENT:

Week-I: BISECTION METHOD

Find the Roots of Non-Linear Equation Using Bisection Method

Week-II: NEWTON'S METHOD

Find the Roots of Non-Linear Equation Using Newton's Method.

Week-III: CURVE FITTING
Curve Fitting by Least Square Approximations.

Week-IV: GAUSS ELIMINATION METHOD
Solve the System of Linear Equations Using Gauss - Elimination Method.

Week-V: GAUSS SEIDAL ITERATION METHOD
Solve the System of Linear Equations Using Gauss - Seidal Iteration Method.

Week-VI: GAUSS JORDEN METHOD
Solve the System of Linear Equations Using Gauss - Jorden Method

Week-VII: TRAPEZIODIAL RULE
Integrate numerically using Trapezoidal Rule.

Week-VIII: SIMPSON'S RULE
Integrate numerically using Simpson's Rules.

Week-IX: EULER'S METHOD
Numerical Solution of Ordinary Differential Equations by Euler's Method.

Week-X: RUNGE KUTTA METHOD
Numerical Solution of Ordinary Differential Equations by Runge- Kutta Method.

Week-XI: NEWTON – RAPHSON METHOD
Numerical Solution of Ordinary Differential Equations Newton – Raphson Method

Week-XII: SECANT METHOD
Numerical Solution of Ordinary Differential Equations secant method

Week-XIII: BRENT'S METHOD
Numerical Solution of Ordinary Differential Equations Brent's method

Week-XIV: MULLER'S METHOD
Numerical Solution of Ordinary Differential Equations Muller's method

V. TEXT BOOKS:

1. Steven Chapra and Raymond Canale, "Numerical Methods for Engineers", McGraw Hill, 7th edition, 2015.

VI. REFERENCE BOOKS:

1. K. Sankara Rao, "Numerical Methods for Scientists and Engineers", PHI Learning, 4th edition, 2018.

VII. ELECTRONICS RESOURCES:

1. http://www.iitg.ac.in/physics/fac/charu/courses/ph508/lab5.pdf
2. https://www.researchgate.net/publication/275014975_A_Numerical_Analysis_Lab_Solving_System_of_Linear_Equations

VIII. MATERIALS ONLINE:

1. Course Template
2. Tutorial Question Bank
3. Assignments
4. Model Question Paper – I
5. Model Question Paper - II
6. Lecture Notes
7. Power point presentation