

## NUMERICAL ANALYSIS LABORATORY

### II Semester: ST

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
BSTC24	Core	0	0	4	2	30	70	100
		<b>Contact Classes: Nil</b>				<b>Total Tutorials: Nil</b>		<b>Total Practical Classes: 36</b>
						<b>Total Classes: 36</b>		

#### 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.	Analyze
CO 2	Evaluate the curve fitting by using method of least squares approximations.	Evaluate
CO 3	Determine the linear system of equations using gauss elimination, gauss seidal and gauss Jordan methods.	Analyze
CO 4	Solve the integrations numerically using trapezoidal and simpson's rule.	Apply
CO 5	Explain the numerical solution of ordinary differential equations using Euler's Method.	Analyze
CO 6	Analyze the numerical solution of ordinary differential equations by using Runge- Kutta Method.	Apply

#### IV. COURSE SYLLABUS:

##### 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 - Jordan 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.

**V.TEXT BOOKS:**

1. Steven Chapra and Raymond Canale, "Numerical Methods for Engineers", McGraw Hill, 7<sup>th</sup> Edition, 2015.

**VI.REFERENCE BOOKS:**

1. K. Sankara Rao, "Numerical Methods for Scientists and Engineers", PHI Learning, 4<sup>th</sup> Edition, 2018.

**VII. WEB REFERENCES:**

1. <http://www.iitg.ac.in/physics/fac/charu/courses/ph508/lab5.pdf>

**VIII. E-TEXT BOOKS:**

1. [https://www.researchgate.net/publication/275014975\\_A\\_Numerical\\_Analysis\\_Lab\\_Solving\\_System\\_of\\_Linear\\_Equations](https://www.researchgate.net/publication/275014975_A_Numerical_Analysis_Lab_Solving_System_of_Linear_Equations)