ADVANCED NUMERICAL TECHNIQUES

B.Tech. III Year I – Semester

(Elective)

Credits	Periods			Exam Hrs.	Sessional Marks	Exam Marks	Total Marks
	Theory	Tutorial	Lab				
3	3	1	-	3	40	60	100

Course Objective :

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Outcomes: At the end of the course, the student will be able to :

1	Apply the numerical methods to find a root of algebraic and transcendental equations
2	Solve linear equations using Jacobi method and Gauss-Seidal method
3	Explain the concepts of Numerical Differentiation and Integration.
4	Be familiar with numerical solution of ordinary differential equations
5	Be familiar with numerical solution of partial differential equations

CO – PO Mapping :

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	**3**	**2**										**1**
CO-2	**3**	**2**										**1**
CO-3	**3**	**2**										**1**
CO-4	**3**	**2**										**1**
CO-5	**3**	**2**										**1**

SYLLABUS

UNIT – I : NUMERICAL SOLUTIONS TO ALGEBRAIC AND TRANSCEDENTAL EQUTIONS : [12 PERIODS]

Introduction – Solutions of algebraic and transcendental equations – Bi-section method – Method of false- position – Newton-Raphson method – Useful deduction from the Newton-Raphson formula.

UNIT – II : ITERATIVE METHODS OF SOLUTION OF SYSTEM OF EQUATIONS

[10 PERIODS]

Solution of linear simultaneous equations: Jacobi's iteration method – Gauss-Seidel iteration method – Relaxation method.

UNIT – III: NUMERICAL DIFFERENTIATION AND INTEGRATION [12 PERIODS]

Numerical differentiation – Formulae for derivatives – Maxima and minima of a tabulated function – Numerical integration – Newton-Cotes quadrature formula – Trapezoidal rule – Simpson's $\frac{1}{3}^{rd}$ –rule , Simpson's T$\frac{3}{8}^{th}$ –rule.

UNIT – IV: NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS [14 PERIODS]

Numerical solution of ordinary differential equations: Picard's Method – Taylor's series method – Euler's method – Runge-Kutta method – Predictor-Corrector methods – Milne's method.

UNIT – V: NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS

[12 PERIODS]

Introduction – Classification of second order equations – Finite difference approximation to derivatives – Solutions of Laplace equation – Poisson's equations – Heat equation and Wave equation.

TEXT BOOK

1. **Dr. B.S. Grewal**, "*Higher Engineering Mathematics*", 43rd Edition, Khanna Publishers, New Dehli, 2014.

REFERENCE BOOKS

1. **S. S. Sastry**, "*Introductory methods of Numerical solutions*" , 4th Edition , Prentice Hall of India.
2. **N.P. Bali Et. al**, "*A Text book on Engineering Mathematics*" , Laxmi pub.(p)Ltd , 2001.
3. **Erwin Kreyszig** , "*Advanced Engineering Mathematics*", John Wiley Publications, 1999.
4. **R.K.Jain & S.R.K.Iyengar**, "*Numerical Methods*" , New Age International (P) Limited, 2008.