

ADVANCED NUMERICAL TECHNIQUES

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

Course Outcomes:

By 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

UNIT – I : NUMERICAL SOLUTIONS TO ALGEBRAIC AND TRANSCEDENTAL EQUATIONS : [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 One-Third rule , Simpson's Three-Eighth 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 Books:

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 Etal, 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 by, New Age International (P) Limited, 2008.