

ME281: Numerical Analysis and Statistics

Teaching Scheme			Credits C	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
3	0	2	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	<p><u>Error Analysis:</u></p> <p>Solution of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton-Raphson method, Secant method.</p>	06
2	<p><u>Solution of Simultaneous Linear Equations:</u></p> <p>Gauss Elimination with backward substitution, Gauss-Jordon and Gauss Seidel method.</p>	04
3	<p><u>Numerical Integration:</u></p> <p>Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Gauss quadrature.</p>	04
4	<p><u>Numerical Differentiation:</u></p> <p>Newton's Forward-difference, Backward-difference and Divided-difference formula.</p>	05
5	<p><u>Numerical Solution of Ordinary Differential Equations:</u></p> <p>Initial-Value and Boundary-Value Problems, Single Step and Multi-Step Methods, Taylor series method, Euler's method, Euler's modified method, Runge-Kutta method of 2nd, 3rd and 4th orders, Multistep methods.</p>	06

6 **Polynomial Interpolation:** 05

Lagrange methods, Newton's forward and backward interpolation formulae, Gauss's forward and backward difference formulae, Interpolation with unequal interval: Newton's divided difference formula.

7 **Probability and Statistics:** 10

Review of fundamental concepts of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation function of Discrete and Continuous distributions, Normal, Poisson and Binomial distributions, Linear Regression analysis and curve fitting.

Total Hrs. 40

Reference Books:

1. Steven Chapra and Raymond Canaled, "*Numerical Methods for Engineers*", 6th Edition, Tata McGraw-Hill.
2. E. Balagurusamy, "*Numerical Methods*", Prentice Hall of India.
3. Steven C Chapra, "*Applied Numerical Methods with MATLAB*", 3rd edition, Tata McGraw Hill Publishing Co Ltd.
4. Sastry S. S., "*Introductory Methods of Numerical Analysis*", 5th edition, Prentice Hall of India.
5. Rao V. Dukkipati, "*Applied Numerical Methods Using MATLAB*", New Age International Publishers.
6. Erwyn Kreyszig, "*Advanced Engineering Mathematics*", John Wiley and Sons, 10th Edition, 2008.