

# Vidyalankar

S.E. Sem. IV [INFT]  
Computational Mathematics

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## SYLLABUS

Time : 3 Hrs.

Theory : 100 Marks  
Term Work : 25 Marks

### 1. Numerical Methods :

- **Errors** : Types and Estimation
- **Solutions to Transcendental and polynomial equations** : Bisection method, Newton-Raphson method, Secant method
- **Numerical Integration** : Trapezoidal Rule, Simpson's 1/3 rd and 3/8<sup>th</sup> rules.
- Solution to system of linear algebraic equations, Gauss elimination methods, Gauss-Jordan elimination method, Gauss-Siedel iteration method.
- **Interpolation** : Linear interpolation, Higher order interpolation using Lagrange's and Newton's method, Finite difference operators and difference tables.

### 2. Statistics :

- Probability
- **Random variables** : Discrete and Continuous random variables, Probability density function, Probability distribution of random variables, Expected value, Variance. Moments and moment generating functions, Relation between Raw moments and Central moments.
- Binomial, Poisson and Normal distributions for detailed study, Central Limit theorem (statement only) and problems based on this theorem.
- **Fitting of curves** : Least square method, Fitting the straight line and parabolic curve, Correlation, Covariance, Karl Pearson's coefficient and Spearman's Rank correlation coefficient, Regression coefficients and lines of regression.

### 3. Sampling Theory :

- Sampling distribution, Test of Hypothesis, Level of Significance, Critical Region, One Tailed and Two Tailed Test, Interval Estimation of Population Parameters, Test of Significance for large Samples and Small Samples, Students 't' Distribution and its properties, Chi-Square Distribution and its properties, Test of the Goodness of fit and Independence of Attributes, Contingency Table, Yates Correction

### 4. Mathematical Programming :

- Linear optimization problem, Formulation and Graphical solution, Basic solution and Feasible solution, Primal Simplex Method.

### 5. SCILAB Applications :

- Programming of Numerical Methods.
  - Use of Scilab for solving system of linear equations.
  - Use of Scilab in Curve Fitting.
  - Use of Scilab for finding coefficient of correlation and regression coefficient.
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**References :**

1. "Elements of Applied Mathematics" (*P. N. Wartikar and J. N. Wartikar*) Volume 1 and 2, A. V. Griha, Pune.
2. "Engineering Mathematics" (*S. S. Shastri*) Vol-2, PHI, 2<sup>nd</sup> Edition, 1994.
3. "Introductory Methods of Numerical Methods" (*S. S. Shastri*) Vol-2, PHI, 2<sup>nd</sup> Edition, 1994.
4. "Applied Numerical Methods for Engineers using SCILAB & C" (*Robert J. Schilling & Sandra L. Harris*) Thomson Brooks / Cole.
5. "Fundamentals of Mathematical Statistics" (*S. C. Gupta, V. K. Kapoor*)
6. "Matrices" (*Shantinakaran*) S. Chand Publication House, Delhi.
7. "Probability and Statistics" (*T. Veerarajan*) TMH
8. "Higher Engineering Mathematics" (*Dr. B. S. Grawal*) Khanna Publications.
9. "Advanced Engineering Mathematics" (*Erwin Kreyszig*) Wiley India, 8<sup>th</sup> Edition.
10. "Numerical Methods for Mathematics, Science & Engineering" (*John S. Mathews*)

