

APPLIED MATHEMATICS - III
(PROBABILITY, STATISTICS AND NUMERICAL METHODS)

Course Code : MAT 301**Credit Units: 03****Total Hours: 30****Course Objective:**

The objective of this course is to familiarize the students with Probability distributions, test of significance and numerical methods. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

Course Contents:**Module I: Basic Statistics: (6 Hours)**

Measures of central tendency, Moments, skewness and kurtosis, Correlation and regression, Rank Correlation, Curve fitting by the method of least squares – fitting of straight lines, second degree parabola and more general curve.

Module II: Basic Probability and expectation: (7 Hours)

Discrete and Continuous random variables and their properties, Dependent and Independent random variables. Probability spaces, conditional probability, sums of independent random variables, Expectation of Discrete Random Variables;

Probability distributions and probability density function for discrete and continuous variable:

Binomial distribution, Poisson's distribution and Normal distribution and evaluation of its statistical parameters.

Module III: Test of significance for Small and large samples: (5 Hours)

Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Module IV: Numerical Methods: (6 Hours)

Solution of simultaneous linear equations by numerical techniques; Jacobi's and Gauss-Seidel method. Solution of algebraic and transcendental equations – Bi-section method, Newton-Raphson method and Regula-Falsi method.

Interpolation : Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formula.

Interpolation for unequal intervals: Newton's divided difference and Lagrange's formulae.

Module V: Numerical Methods: (6 Hours)

Numerical differentiation and integration: Picard's method, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Ordinary differential equation : Taylor's series, Euler's and modified Euler's methods, Runge-Kutta method of fourth order, Milne's and Adam's predictor-corrector methods.

Course Outcomes:

- The objective of this course is to familiarize the students with statistical and numerical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
- The students will learn: The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- Numerical techniques to solve simultaneous linear equations, interpolation and extrapolation.
- Numerical techniques of differential and integral.
- Solution of ordinary differential equation by numerical techniques.

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Text/ Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003(Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.