

**MATHEMATICS-III**  
( PDE, PROBABILITY & STATISTICS)  
(Mechanical Engineering)

Instruction :	4 Periods per week (3 Theory + 1 Tutorial)
Duration of SEE:	3 Hours
SEE:	70 Marks
CIE:	30 Marks
Credits :	4
Course Objectives:	

- To introduce the solution methodologies for first order and second order partial differential equations.
- To introduce separation of variables method to solve heat and wave equation.
- To learn random variables and their properties.
- To understand probability distributions, curve fitting, correlation and regression.
- To introduce tests of significance.

Course Outcomes:

Upon completion of this course, students will be able to

- solve linear first order and second order partial differential equations.
- solve one-dimensional heat and wave equations using separation of variables.
- solve problems involving random variables.
- fit curves for a given data and perform a regression analysis and to compute and interpret the coefficient of correlation.
- estimate unknown parameters of populations and apply the tests of hypotheses.

**Unit-I:** Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method.

**Unit-II:** Second-order linear equations and their classification, Initial and boundary conditions, D'Alembert's solution of the wave equation; Heat diffusion equation, Separation of variables method to simple problems in Cartesian coordinates., one dimensional diffusion equation and its solution by separation of variables.

**Unit-III:** Measures of Central tendency: Moments, skewness and Kurtosis, Discrete random variables, expectation of discrete random variables, moments, variance of a sum, continuous random variables & their properties, distribution functions, and densities.

**Unit-IV:** Probability distributions: Binomial, Poisson and Normal, evaluation of statistical parameters for these three distributions, Curve fitting by the method of least squares: fitting of straight lines, second degree parabolas and more general curves, Correlation, regression and rank correlation.

**Unit-V:** Test of significance: Large sample test for single proportion, difference of proportions, Small sample Test for single mean, difference of means, and difference of standard deviations, Test for ratio of variances, Chi- square test for goodness of fit and independence of attributes.

**Textbooks/References:**

1. R.K.Jain & S.R.K Iyengar, Advanced Engineering Mathematics, Narosa Publications, 4<sup>th</sup> Edition 2014.
2. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43<sup>rd</sup> Edition.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons.2006.
4. S. Ross, "A First Course in Probability", Pearson Education India, 2002.
5. S.C Gupta & Kapoor: Fundamentals of Mathematical statistics, Sultan chand & sons, New Delhi.