

Semester III

MS205	Mathematics III	L-T-P-CR-CH : 3-0-0-3-3
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Course Objectives

- CO1. To explain the basic concepts of probability, statistics and partial differential equation.
- CO2. To elaborate the concepts of random variables, probability distributions and their various uses.
- CO3. To demonstrate moments, correlation, regression and advance theory of applied statistics.
- CO4. To explain different orders of linear and non-linear partial differential equations and their solving procedures.
- CO5. To demonstrate the basics of curve fitting and its various applications.

Learning Outcomes

Upon the completion of the course, the students will be able to:

- LO1. Apply the knowledge of binomial, poisson and normal distribution for engineering application.
- LO2. Recall different problems related to moments, skewness, kurtosis and correlation, regression
- LO3. Measure various physical models through discreet and continuous distributions.
- LO4. Identify the use of different test of significance to various engineering problems.
- LO5. Analyse the techniques of partial differential equations to solve physical and other problems involving functions of several variables
- LO6. Determine heat and sound equations, fluid flow, elasticity, electrostatics, electrodynamics, etc., problems using partial differential equation techniques.

SYLLABUS

Unit 1: Basic Probability (10 lectures)

Probability spaces, conditional probability, Discrete random variables, Independent random variables, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, infinite sequences of Bernoulli trials, Probability distributions: Binomial, Poisson - evaluation of statistical parameters for these distributions, Poisson approximation to the binomial distribution.

Unit 2: Continuous Probability Distributions (5 lectures)

Continuous random variables and their properties, distribution functions and densities, normal, exponential, and gamma densities.

Unit 3: Applied Statistics (11 lectures)

Moments, Skewness, Kurtosis, Chebyshev's Inequality, Correlation and regression, method of least squares. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Unit 4: Curve fitting (4 lectures)

Curve fitting - fitting of straight lines, second degree parabolas and more general curves. Splines fitting.

Unit 5: Partial differential equations (15 lectures)

Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear and non-linear PDEs. Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Second-order linear equations and their classification. Method of separation of variables.

Total: (45 lectures)

Text Books

1. Advanced Engineering Mathematics, H. K. Dass, S. Chand, 22nd edition, 2018.
2. Higher Engineering Mathematics: B. V. Ramana. McGraw Hill, 6th edition, 2010.
3. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science, 5th edition, 2016.
4. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 44th edition, 2017.

Reference Books

1. Ordinary and Partial Differential Equations, M.D. Raisinghania, S. Chand, 20th edition, 2020.
2. Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, S. Chand, 10th edition, 2017.