

ACE R25- BoS Approved Syllabus

PROBABILITY, STATISTICS AND COMPLEX VARIABLES (MA301BS)

B.Tech. II Year I Sem. ME

L T P C

Pre-requisites: Mathematics courses of first year of study.

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Course Objectives: To learn

1. The ideas of random variables and various discrete and continuous probability distributions and their properties.
2. The statistical methods of studying data samples.
3. Differentiation and integration of complex valued functions.
4. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
5. Expansion of complex functions using Taylor's and Laurent's series.

Course outcomes: After learning the contents of this paper, the student must be able to

1. Apply the concepts of Random variable and distributions to some case studies.
2. Correlate the concepts of one unit to the concepts in other units.
3. Understand sampling theory and apply hypothesis testing in real-world scenarios
4. Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
5. Taylor's and Laurent's series expansions in complex function.

UNIT - I: Random Variables and Probability Distributions

Concept of a Random Variable – Discrete Probability Distributions – Continuous Probability Distributions – Mean of a Random Variable – Variance of a Random Variable Discrete Probability Distributions: Binomial Distribution – Poisson distribution

UNIT - II: Continuous Distributions and sampling

Uniform Distribution – Normal Distribution – Areas under the Normal Curve – Applications of the Normal Distribution – Normal Approximation to the Binomial Distributions. Fundamental Sampling Distributions: Random Sampling – Some Important Statistics – Sampling Distributions – Sampling Distribution of Means – Central Limit Theorem.

UNIT - III: Tests of Hypotheses (Large and Small Samples)

Statistical Hypotheses: General Concepts – Testing a Statistical Hypothesis. Single sample: Tests concerning a single mean. Two samples: Tests on two mean (Unknown for equal variance). One sample: Test on a single proportion. Two samples: Tests on two proportions. Two- sample tests concerning variances: F-distribution

UNIT - IV: Complex Differentiation

Differentiation of Complex functions – Analyticity – Cauchy-Riemann equations (without proof) –Harmonic Functions – Finding harmonic conjugate – Milne Thomson method – Elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT - V: Complex Integration

Line integral – Cauchy's theorem – Cauchy's Integral formula – Zeros of analytic functions –Singularities – Taylor's series – Laurent's series. Residues – Cauchy Residue theorem (All theorems without Proof).

TEXT BOOKS

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. Murray R. Spiegel, Seymour Lipschutz, John J Schiller, Dennis Spellman, Complex variables (Schaum's outline)

REFERENCE BOOKS

1. T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.
3. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations 2002
4. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
5. J W Brown and R V Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill, 2004