

ACE R25- BoS Approved Syllabus

MATHEMATICAL AND STATISTICAL FOUNDATIONS (MA301BS)

B.Tech. II Year I Sem. CSE(AI&ML), CSE(DS), CSE(IoT) & IT

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

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Objectives: To learn

1. The Number Theory basic concepts useful for cryptography etc.
2. The theory of Probability, and probability distributions of single random variables.
3. The sampling theory and testing of hypothesis and making inferences.
4. The curve fitting, correlation and regression for the given data.

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

1. Apply the number theory concepts to cryptography domain.
2. Apply the concepts of probability and distributions to some case studies.
3. Correlate the material of one unit to the material in other units.
4. Resolve the potential misconceptions and hazards in each topic of study.
5. Fit the curve, correlation, and regression for the given data.

UNIT-I: Basics of Number Theory

Greatest Common Divisors and Prime Factorization: Greatest common divisors – The Euclidean algorithm – The fundamental theorem of arithmetic – Factorization of integers and the Fermat numbers. Congruences: Introduction to congruences – Linear congruences.

UNIT-II: 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-III: 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-IV: 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-V: Applied Statistics

Curve fitting by the method of least squares – Fitting of straight lines – Second degree parabolas and more general curves – Correlation and Regression – Rank correlation.

TEXT BOOKS

1. Kenneth H. Rosen, Elementary Number Theory & its Applications, sixth edition, Addison Wesley.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
3. S C Gupta and V K Kapoor, Fundamentals of Mathematical Statistics, Khanna publications.

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.