PROBABILITY, STATISTICS AND NUMERICAL METHODS
(Common to CSE, IT & CE)

Course Code: 13BM1103	L	T	P	C
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Pre requisites:

❖ Fundamentals of Set theory and calculus.

❖ Basic concepts of Probability and Discrete Random Variables.

Course Educational Objectives:

To acquaint students with the fundamental concepts of probability and statistics and to develop an understanding of the role of statistics in engineering. Also to introduce Numerical techniques to solve the real world applications.

Course Outcomes:

Upon successful completion of the course, the students should be able to

❖ Calculate fundamental concepts such as the cumulative distribution function, expectations, and distributions of random variables.

❖ Evaluate estimators, construct confidence intervals, and perform hypothesis tests.

❖ Solve engineering problems using Numerical techniques.

UNIT-I   (12 Lectures)

Review of basic concepts in Probability and Discrete Random variables, Continuous Random variables - Probability density, Distribution. Calculating probabilities from Probability density, Determining Mean and Variance using Probability density, Normal Distribution- Density and Properties. Calculating Normal Probabilities, Normal Approximation to Binomial Distribution, Uniform Distribution.

(5.1, 5.2, 5.3, 5.5 of [1])

UNIT-II   (12 Lectures)

Population and sample, Sampling distribution of the mean(s known), Central Limit theorem (without Proof) and Problems, Sampling distribution of the mean(s unknown), Point Estimation, Maximum error and determination of sample size, Interval Estimation (Large sample and small sample)
(6.1, 6.2, 6.3, 7.1, 7.2 of [1])

UNIT-III   (12 Lectures)

Tests of Hypotheses (Introduction, Null hypotheses, Alternative hypotheses, Type –I,II errors, Level of significance, Hypotheses concerning one mean (Large and Small samples), Inference concerning two means (Large and Small samples), Paired t-test.

Estimation of Variances (point and Interval estimation), Hypotheses concerning one variance, Hypotheses concerning two variance, Estimation of Proportions, Hypotheses concerning one Proportion, Hypotheses concerning several Proportions.
(7.3, 7.4, 7.5, 7.8, 8.1, 8.2, 8.3, 9.1, 9.2, 9.3 of [1])

UNIT-IV   (12 Lectures)

Introduction to Numerical Methods, Solution of algebraic and transcendental equations-Bisection method, Method of false position Newton's method.

Finite differences-Forward differences Backward differences, Central differences, Differences of a polynomial, Other Difference operators – Shift operator, Average operator, Relations between the operators.
(28.1 to 28.3, 29.1 to 29.5 of Text book [2])

UNIT-V   (12 Lectures)

Newton's interpolation formulae- Newton's forward interpolation formula Newton's backward interpolation formula, Interpolation with un equal intervals: Lagrange interpolation, Divided differences, Newton's divided difference formula Difference formula, Inverse interpolation.

Numerical solutions of Ordinary differential equations: Euler's Method, Modified Euler's Method, Runge-Kutta method of order 4.
(29.6, 29.9 - 29.13, 32.4, 32.5, 32.7 of Text book [2])

TEXT BOOKS:

1. Richard A.Johnson, C.B.Gupta, *"Miller. Freund's Probability and Statistics for Engineers",* Seventh edition, Pearson education, 2005.

2. Dr.B.S.Grewal, *"Higher Engineering Mathematics"*, 42nd Edition, Khanna Publishers, 2012.

REFERENCES:

1. S. S. Sastry, *"Introductory Methods of Numerical Analysis",* 4th Edition, Prentice Hall India Pvt., Limited, 2005.

2. S.C. Gupta and V.K. Kapoor, *"Fundamentals of Mathematical Statistics",* Ninth Revised Edition , Sultan Chand & Sons Educational Publishers, 2007.