



# GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3130006

Semester – III

Subject Name: Probability and Statistics

**Type of course:** Basic Science Course

**Prerequisite:** Probability basics

**Rationale:** Systematic study of uncertainty (randomness) by probability - statistics and curve fitting by numerical methods

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	2	0	5	70	30	0	0	100

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
01	<b>Basic Probability:</b> Experiment, definition of probability, conditional probability, independent events, Bayes' rule, Bernoulli trials, Random variables, discrete random variable, probability mass function, continuous random variable, probability density function, cumulative distribution function, properties of cumulative distribution function, Two dimensional random variables and their distribution functions, Marginal probability function, Independent random variables.	08	20 %
02	<b>Some special Probability Distributions:</b> Binomial distribution, Poisson distribution, Poisson approximation to the binomial distribution, Normal, Exponential and Gamma densities, Evaluation of statistical parameters for these distributions.	10	25 %
03	<b>Basic Statistics:</b> Measure of central tendency: Moments, Expectation, dispersion, skewness, kurtosis, expected value of two dimensional random variable, Linear Correlation, correlation coefficient, rank correlation coefficient, Regression, Bounds on probability, Chebyshev's Inequality	10	20%
04	<b>Applied Statistics:</b> Formation of Hypothesis, Test of significance: Large sample test for single proportion, Difference of proportions, Single mean, Difference of means, and Difference of standard deviations. Test of significance for Small samples: t- Test for single mean, difference of means, t-test for correlation coefficients, F- test for ratio of variances, Chi-square test for goodness of fit and independence of attributes.	10	25 %
05	Curve fitting by the numerical method: Curve fitting by of method of least squares, fitting of straight lines, second degree parabola and more general curves.	04	10 %



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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
7	28	35	0	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table. This subject will be taught by Maths faculties.

### Reference Books:

- (1) P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall.
- (2) S. Ross, A First Course in Probability, 6th Ed., Pearson Education India.
- (3) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, Wiley.
- (4) D. C. Montgomery and G. C. Runger, Applied Statistics and Probability for Engineers, Wiley.
- (5) J. L. Devore, Probability and Statistics for Engineering and the Sciences, Cengage Learning.

### Course Outcome:

Sr. No.	CO statement	Marks % weightage
CO-1	understand the terminologies of basic probability, two types of random variables and their probability functions	20 %
CO-2	observe and analyze the behavior of various discrete and continuous probability distributions	25 %
CO-3	understand the central tendency, correlation and correlation coefficient and also regression	20%
CO-4	apply the statistics for testing the significance of the given large and small sample data by using t- test, F- test and Chi-square test	25 %
CO-5	understand the fitting of various curves by method of least square	10 %

### List of Open Source Software/learning website:

MIT Opencourseware. NPTEL.