GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Integrated M.Sc. (Computer Science)
(With Specialization: AI and Data Science/IoT/ Cyber Security)

With effective from academic year 2022-23

Subject Code: 1340302
Semester- IV
Subject Name: Statistical Methods and Probabilities

Teaching and Examination Scheme

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA (M)	PA (V)	PA (I)	
3	2	0	4	70	30	30	20	150

Content:

Sr. No.	Content	Teaching Hours	Module Weightage (%)
1.	**Basic Probability**: 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	25
2.	**Some special Probability Distributions**: Binomial distribution, Poisson distribution, Poisson approximation to the binomial distribution, Normal, Exponential and Gamma densities, Evaluation of statistical parameters for these distributions.	10	25
3.	**Basic Statistics**: 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	08	20
4.	**Applied Statistics**: 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	20

5.	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

Reference Books:

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

Course Outcome:

After learning the course, the students should be able to:

No.	CO statement
CO 1	Understand the terminologies of basic probability, two types of random variables and their probability functions
CO 2	Observe and analyze the behaviour of various discrete and continuous probability distributions
CO 3	Understand the central tendency, correlation and correlation coefficient and also regression
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
CO 5	Understand the fitting of various curves by method of least square