1.

PROBABILITY & STATISTICS
(Common to CSE & IT)

23MA1107 **Credits:3**

Instruction : 3 periods & 1 Tutorial/Week Sessional Marks:40
End Exam : 3 Hours End Exam Marks:60

Prerequisites: Elementary knowledge of set theory, combinations and basic statistics.

Course Objectives:

To provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering.

Course Outcomes: At the end of the course, students will be able to

1.	Analyze the basic principles of statistical measures and probability.
2.	Demonstrate a random variable that describe randomness or uncertainty in certain realistic situation.
3.	Differentiate the concepts of discrete, continuous probability distributions and able to solve problems of probability.
4.	Evaluate simple correlation between the two variables and fit curves by the method of least square approximation.
5.	Analyze the statistical data and apply various small and large samples tests for testing the hypothesis.

CO-PO –PSO Mapping:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2										1			
CO2	3	2										1			
CO3	3	2										1			
CO4	3	2										1			
CO5	3	2										1			

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

CO-PO-PSO Justification	
1	CO 1 deals with the knowledge of statistical measures and probability is widely used for algorithm development, data analysis, machine analysis and simulation modelling.
2	CO 2 deals with the knowledge of random variable is a vital tool in machine learning. It creates functions for understanding possible outcomes.
3	CO 3 deals with the knowledge of probability distributions is widely used in speech recognition, robotics and network traffic etc.
4	CO 4 deals with the knowledge of curve fitting is widely used as an aid for data visualization and regression is to summarize the relationship among two or more variables.
5	CO 5 deals with the knowledge of testing of hypothesis is mainly used for making statistical decision using experimental data in various filed of computer science.

SYLLABUS

UNIT I **10 Periods**

STATISITCAL METHODS AND DATA ANALYSIS

Measures of central tendency : Mean – Median – Mode.

Measures of dispersion : Mean deviation – Standard deviation – Variance.

PROBABILITY

Introduction to Probability : Definition of random experiment – Events and sample space – Definition of probability – Addition and multiplication theorems – Conditional probability – Baye's theorem – Simple problems on Baye's theorem.

UNIT II **10 Periods**

RANDOM VARIABLES

Discrete and continuous random variables – Distribution function of random variable – Properties, Probability mass function, Probability density function – Mathematical expectation – Properties of mathematical expectation – Moments – Moment generating function – Mean and variance – Simulation of random variable – Solving problems by using Monte Carlo method.

UNIT III **10 Periods**

PROBABILITY DISTRIBUTIONS

Discrete Distributions: Binomial distribution – Poisson distribution – Mean, Variance, Moment Generating function and problems.

Continuous Probability Distributions: Uniform distribution – Exponential distribution, Memoryless property – Normal distribution – Properties of normal distribution – Importance of normal distribution – Area properties of normal curve – MGF – Mean ,variance and simple problems.

UNIT IV **10 Periods**

CORRELATION, REGRESSION ANALYSIS AND CURVE FITTING

Correlation : Definition – Karl pearson's coefficient of correlation – Measures of correlation – Rank correlation coefficients.

Regression : Simple linear regression – Regression lines and properties.

Curve Fitting : Principle of least squares – Method of least squares – Fitting of straight lines – Fitting of second degree curves and exponential curves.

UNIT V **10 Periods**

TESTING OF HYPOTHESIS

Introduction – Null hypothesis – Alternative hypothesis – Type – I , II errors – Level of significance – Critical region – Confidence interval – One sided test – Two sided test.

Small Sample Tests : Students t - distribution and its properties – Test of significance difference between sample mean and population mean – Difference between means of two small samples – F- Distribution – Test of equality of two population variances – Chi-square test of goodness of fit .

Large sample Tests : Test of significance of large samples – Tests of significance difference between sample proportion and population proportion & difference between two sample proportions – Tests of significance difference between sample mean and population mean & difference between two sample means.

TEXT BOOK :

T. Veerarajan, *Probability, Statistics and Random Processes*, Tata McGraw Hill Publications.

REFERENCE BOOKS:

1. **Kishor S. Trivedi**, *Probability & Statistics with Reliability, Queuing and Computer Applications*, Prentice Hall of India .
2. **B. S. Grewal**, *Higher Engineering Mathematics*, 43rd edition, Khanna publishers, 2017.
3. **Sheldon M. Ross,** *Probability and Statistics for Engineers and Scientists*, Academic Press.
4. **S C Gupta and V.K.Kapoor**, *Fundamentals of Mathematical Statistics*.