Devi Ahilya Vishwavidhyalaya, Indore, India **Institute of Engineering & Technology**					**II Year B.Tech. (Information Technology)**	
Course Code & Name	**Instructions Hours per Semester and Credits**					
4RIPC1 **Applied Statistics**	**Classroom Instruction (CI)**		**Lab Instruction (LI)**	**Term Work (TW) and Self Learning (SL)**	**Total no. of Hours Per semester**	**Total Credits (Total Hours/30)**
	L	**T**	**P**	**TW+SL**		
	20	**10**	**-**	**60**	**90**	**3**

Course Learning Objectives:

1. Understand and apply concepts of multivariate analysis, regression, correlation, and probability distributions to analyze complex statistical data.
2. Analyze and evaluate discrete and continuous random variables, cumulative distribution functions, normal distribution, and system reliability for real-life applications.
3. Classify and model stochastic processes, including Poisson and Markov processes, and compute transition probabilities in Markov chains.
4. Apply and analyze queuing theory models (M/M/1, M/M/C) to evaluate system performance measures such as waiting time and queue length.
5. Formulate, test, and interpret statistical hypotheses using tests of significance, goodness-of-fit, F-tests, and ANOVA for data-driven decision-making.

Prerequisite:

Basic knowledge of **undergraduate-level mathematics**, including **descriptive statistics, probability, algebra, and introductory calculus**.

COURSE CONTENTS

UNIT-I

Multivariate analysis, plane of regression, Multiple and partial correlation,
Random variables-discrete and continuous random variables, cumulative distribution function. Normal distribution.
Reliability: Basic Concepts, Evaluation of system reliability.

UNIT-II

Stochastic processes-classification, special stochastic processes-Poisson process, Markov process, Markov chains, n-step transition probabilities.

UNIT-III

Queuing Theory: Objectives and characteristics of a Queuing System, classification of Queuing models, probability distribution of arrival and service times, Models (M/M/1, M/M/C).

UNIT-IV

Elements of Hypothesis Testing: Null and Alternative hypotheses, Simple and Composite hypotheses, Critical Region, type I and type II Errors, Level of significance and size, p-value. Test of significance of large and small samples. Test of goodness of fit and independence of attributes.

UNIT-V

F-test and ANOVA: one-factor and two factor classifications.

Course Outcomes: Applied Statistics

After successful completion of this course, the students will be able to:

CO1 (Unit I)	Apply and analyse concepts of multivariate analysis, regression, correlation, probability distributions, and reliability theory to solve practical statistical and engineering problems.
CO2 (Unit II)	Classify, model, and analyse stochastic processes such as Poisson processes and Markov chains, and compute transition probabilities for real-life random systems.
CO3 (Unit III)	Understand, formulate, and analyse queuing systems and evaluate performance measures using standard queuing models like M/M/1 and M/M/C.
CO4 (Unit IV)	Formulate and test statistical hypotheses using appropriate tests of significance, and interpret results using p-values, confidence levels, and goodness-of-fit tests.
CO5 (Unit V)	Apply and compare variance analysis techniques such as F-test and one-way and two-way ANOVA for decision-making in experimental and data analysis contexts.

Books Recommended:

[1]. T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw - Hill Education, 2002.
[2]. K. S. Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, John Wiley & Sons, 2006.
[3]. Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
[4]. S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, Mumbai, 6th Ed., 2009.

CO–PO Mapping Table

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1							1
CO2	3	3	1	2	1							2
CO3	2	3	2	2	1							1
CO4	3	3	1	3	1							2
CO5	3	3	2	3	1							2