Course Description

Course Title and Code: Probability and Statistics (AS1117)	
Hours per Week	**L-T-P: 3-0-2**
Credits	**4**
Pre-requisite	**None**
Students who can take	B. Tech III Sem
Evaluation	Theory – 70%, Lab – 30%

Course Objective: This course introduces computational analysis of data based on fundamental concepts of statistics. The course will include utilizing MS Excel and Python in a hands-on way to solve various problems related to statistical data analysis.

Learning Outcomes:

On successful completion of this course, the students should be able to:

1. develop programs for analyzing and interpreting complex situations in various domains including sustainable development using statistical methods.
2. summarize and visualize different datasets.
3. analyze and interpret different datasets using discrete and continuous probability distributions and apply the same for problem-solving, e.g., Goodness of Fit.
4. formulate and validate hypotheses with reference to different datasets.
5. apply correlation, regression, and least square method, for modeling, analysis, interpretation, and forecasting.

Syllabus

Descriptive Statistics

Measures of central tendency, measures of dispersion, skewness and kurtosis, frequency distributions, graphical representation, measures of locations, and variability.

Probability Theory

Introduction to probability, conditional probability, Bayes' theorem, Discrete and continuous random variables, Probability mass and density functions, Probability distributions: Binomial, Poisson, Uniform, Normal, Exponential

Sampling Distributions

Sampling, Types of sampling, sampling errors, sampling distribution of means, variance, and proportions for the normal population, The Central Limit Theorem, Chi-Square, t, and F distributions, Point and interval estimation.

Test of Hypothesis

Null and alternative hypotheses, types of errors, p-values, Parametric test of hypothesis based on mean, variance, and proportion, goodness-of-fit tests, One-way analysis of variance (ANOVA), correlation, and regression analysis.

Evaluation Scheme

Sr. No	Specifications	Marks
1	Attendance	05
2	Assignment	Nil
3	Class Participation	Nil
4	Quiz	Nil

5	Theory Exam-I	15
6	Theory Exam-II	20
7	Theory Exam-III	30
8	Report-I	Nil
9	Report-II	Nil
10	Report-III	Nil
11	Project-I	20
12	Project-II	Nil
13	Project-III	Nil
14	Lab Evaluation-I	10
15	Lab Evaluation-II	Nil
16	Course Portfolio	Nil
17	Presentation	Nil
18	Viva	Nil
	Total (100)	**100**

Text and Reference Books

1. Richard A. Johnson, Miller and Freund's Probability and Statistics for Engineers, PHI.
2. Douglas C. Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, John Wiley & Sons, Inc., 3rd Edition (2004).
3. Meyer, P. L., Introductory Probability and Statistical Applications, Oxford & IBH (1970).
4. Baisnab, A. P. and Jas, Manoranjan, Elements of Probability and Statistics, Tata McGraw Hill, 13th Reprint (2006).
5. J. Ravichandran, Probability and Statistics for Engineers, Wiley India, New Delhi (2010).

Course Articulation Matrix: (Mapping of COs with POs)

CO	Correlation with Program Outcomes															Correlation with Program-Specific Outcomes	
	PO 1	PO 2a	PO 2b	PO 2c	PO 3a	PO 3b	PO 3c	PO 4a	PO 4b	PO 4c	PO 5a	PO 5b	PO 6	PO 7a	PO 7b	PSO 1	PSO 2
AS1117.1						1	1					1			1		
AS1117.2						1	1		1			1		2			
AS1117.3			1	1		1	1		1			1		1	1		
AS1117.4			1	1		2	1		2			1		1	1		
AS1117.5			1	1		2	1		2		1	1		1	1		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation