Semester: VI					
ADVANCED STATISTICAL METHODS (Theory) (Group E: Global Elective)					
Course Code	:	18G6E15		CIE	:	100 Marks
Credits: L:T:P	:	3:0:0		SEE	:	100 Marks
Total Hours	:	39L		SEE Duration	:	3.00 Hours

Course Learning Objectives: The students will be able to

1	Adequate exposure to understand the basic knowledge on classification and regression trees that form the foundation for analyzing data.
2	Use the concepts of cluster analysis and conjoint analysis techniques arising in various fields.
3	Apply the concepts of discriminant analysis and factor analysis which have great significance in engineering practice.
4	Demonstrate the practical importance of regression and loglinear models.

Unit-I	07 Hrs
Classification and Regression Trees: Introduction, the Basic Tree Model, Categorical or Quantitative Predictors, Regression Trees, Classification Trees, Stopping Rules, Pruning and Cross-Validation, Loss functions, Geometry.	
Unit – II	**07 Hrs**
Cluster Analysis: Introduction, Types of Clustering, Correlations and Distances, Hierarchical Clustering, Partitioning via K-means, Additive Trees.	
Unit –III	**08 Hrs**
Conjoint Analysis: Introduction, Additive Tables, Multiplicative Tables, Computing Table Margins based on an Additive Model, Applied Conjoint Analysis.	
Unit –IV	**08 Hrs**
Discriminant Analysis and Factor Analysis: Introduction, Linear Discriminant Model, Linear discriminant function, Discriminant analysis, Principal Component, Factor Analysis, Principal Components versus Factor Analysis, Applications and Caveats.	
Unit –V	**09 Hrs**
Logistic Regression and Loglinear Models: Introduction, Binary Logit, Multinomial Logit, Conditional Logit, Discrete Choice Logit, Stepwise Logit, Fitting a Loglinear Model.	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Explore the fundamental concepts of statistical methods arising in various fields engineering.
CO2:	Apply the knowledge and skills of statistical techniques to understand various types of analysis.
CO3:	Analyze the appropriate statistical techniques to solve the real world problem and to optimize the solution.
CO4:	Distinguish the overall knowledge gained to demonstrate the problems arising in many practical situations.

Reference Books	
1	Statistics I, SYSTAT 10.2, ISBN 81-88341-04-5.
2	Nonparametric Statistical Inference, Gibbons J., D., and Chakraborti, S., 4th Edition, 2003, Marcel Decker, New York. ISBN: 0-8247-4052-1.
3	Applied Statistics and Probability for Engineers, Douglas C. Montgomery and George C. Runger, 6th Edition, 2014, John Wiley & Sons, ISBN: 13 9781118539712, ISBN (BRV):9781118645062.
4	An Introduction to Multivariate Analysis, T. W. Anderson, 3rd Edition, 2003, John Wiley & Sons, New Jersey, ISBN: 0-471-36091-0.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by the way of Tests (T), Quizzes (Q),) and Experiential Learning (EL). Three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. Minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The marks component for experiential learning is 20.
Total CIE is 50 (T) +30 (Q) +20 (EL) = 100 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for the course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	-	-	-	-	-	-	-	2
CO2	3	2	1	-	-	-	-	-	-	-	-	2
CO3	2	3	2	2	-	-	-	-	-	-	-	1
CO4	3	3	1	2	1	-	-	-	-	-	-	3

High-3: Medium-2: Low-1