COURSE TITLE	**ADVANCED STATISTICAL METHODS**
COURSE CODE	**05MD0201**
COURSE CREDITS	**5**

Course Outcomes: After completion of this course, student will be able to:

1. Infer about population parameter and test various hypothesis based on single population parameter.
2. Interpret about equality of two populations parameters using hypothesis testing methods.
3. Compare equality of more than two populations mean using ANOVA.
4. Determine relationship between two sets of data using correlation and regression analysis and predict outcome.
5. Determine relationship between more than two sets of data using multiple regression model, predict outcome and develop expertise in building linear model.

Pre-requisite of course: Basic Knowledge of Statistics

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Inferential Statistics-1** Introduction , Concepts in Hypothesis Testing, Null and Alternative Hypotheses, One-Tailed Versus Two-Tailed Tests, Types of Errors, Significance Level and Rejection Region, Concept of p-values, Z-test for Single Population Proportion, Examples , Z-test for Single Population Mean, Examples , t-test for Single Population Mean, Examples , Mix Examples , Activity 1: Discussion of Application of hypothesis testing	12
2	**Inferential Statistics-2** Introduction, Z-test for Differences between Two Population Proportions, Examples, Z-test for Differences between Two Population Means, Examples , t-test for Differences between Two Population Means, Examples , Paired t-test, Examples , Mix Examples , Applications , Class Test 1	12
3	**Analysis of Variance (ANOVA)** Introduction , Completely Randomized Design, One-Way ANOVA, Examples , Randomized Block Design, Two-Way ANOVA, Examples , Multiple Comparison using Fisher's LSD, Examples , Mix Examples , Activity : MCQ based quiz	10

Contents : Unit	Topics	Contact Hours
4	**Bivariate Analysis: Correlation Analysis** Introduction , Scatter Diagram, Examples , Karl Pearson Corelation Coefficient , Examples , Testing Significance of Correlation Coefficient, Examples , Mix Examples	10
5	**Multiple Regression Analysis (MLR) and Model Building** Introduction , MLR Model Building , MLR equation, Examples , Interpretation of Coefficients, Model Assumptions and Testing for Significance, Prediction using MLR, Examples , Mix Examples , Introduction to Logistic Regression , Class Test 2	12
Total Hours		**56**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Unit - 1** Calculating P-Value based on the given dataset, Calculating P-Value in excel ofr coorelation based on the given dataset, Calculate one-tail and two-tail p-value based on the given dataset, Calculate Z-test based on the given dataset, Conduct a hypothesis test using a certain level of certain level of significance to find the test of a single population mean	8
2	**Unit - 2** Calculate the p-value by using T test function, Calculate the p-value by using Analysis toolpack, Perform two sample T test in excel, Perform two sample Z test	6
3	**Unit - 3** Perform a single factor ANOVA (analysis of variance) in Excel single factor or one-way ANOVA to test the null hypothesis, Calculate Two-factor ANOVA in excel with replication, Calculate Two-way ANOVA in excel without replication	4
4	**Unit - 4** Calculate Pearson and coorelation for the given dataset, Calculate Testing Significance of Correlation Coefficient of the given dataset, Construct a scatter plot of the data & do Regression Analysis of the given dataset	6
5	**Unit - 5** Perform multiple linear regression on the given dataset, Perform multiple Regression Analysis on any given dataset, Calculate R square change using two blocks for regression analysis	6
Total Hours		**30**

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking**

Instructional Method:

1 PPT

2 Board Work

Digitally signed by (Name of HOD) **Digitally signed by (Name of Dean/ Principal)**