

**Paper DSC 403: FORECASTING & PREDICTIVE ANALYTICS****Hours Per Week:** (3T+4P)**Credits:** 5**Exam Hours:** 1 ½**Marks:** 50T+35P+15I**Objective:** To make students to understand the Analytics of Forecasting & Predictive**UNIT I: REGRESSION, FORECASTING & DISTANCE:**

Bivariate regression: Identify linear regression models and their application in data analysis - Calculate linear bivariate regressions in order to model commonly encountered problems - Determine the quality of fit of a linear model, establishing its usefulness for prediction - Multivariate regression: Identify multivariate linear regression models in data analytics - Calculate linear multivariate regressions in order to model commonly encountered problems - Determine the quality of fit of a multivariate linear model, establishing its usefulness for prediction - Other regressions: Identify logistic regression models and apply those models to common business problems - Determine the quality of fit of a multivariate linear model - Forecasting in time: Identify the components of a time forecast in order to predict future values from a model - Differentiate seasonal variations from trends in order to improve prediction of future values from a model - Calculate seasonal indices so that seasonal variations can be qualified in the model - Measuring Distance: Identify the meaning of dimensionality and its implications in analytics - Calculate different types of distances and identify scenarios when each type is applicable.

**UNIT II: CLASSIFICATION:**

Classification k Nearest Neighbor (KNN): Determine core aspects of classification in order to understand when it's an appropriate technique - Calculate kNN algorithm with fixed or variable number of k and assess the quality of the results - Classification Naïve Bayes: Identify Naïve Bayes classification and when it is applicable - Apply a Naïve Bayes classification to a common business problem - Classification Support Vector Machine: Identify the basics of the support vector machine (SVM) classification algorithm - Identify what a support vector is and its use in the classification algorithm - Calculate a SVM classification to solve common business problems - Classification Decision Trees: Identify the steps to build a decision tree classifier - Apply the steps to create a basic decision tree - Use a decision tree algorithm and appropriate metrics to solve a business problem and assess the quality of the solution

**UNIT III: CLUSTERING:**

Determine core aspects and types of clustering in order to properly apply the algorithms to business problems - Apply various clustering algorithms to data sets in order to solve common, applicable business problems.

**UNIT IV: OPTIMIZATION:**

Identify the goals and constraints of a linear optimization - Calculate a linear optimization in order to solve a business problem.

**UNIT V: SIMULATION:**

Use data analysis performed on historical data and any applicable theory to construct a model - Use a Monte Carlo analysis with the model in order to generate and assess the likelihood of predictions from the model.

**SUGGESTED READINGS:**

1. Forecasting and Predictive Analytics Certificate; AICPA
2. Fundamentals of Business Analytics, 2nd Edition; R N Prasad, Seema Acharya; Wiley
3. Business Analysis with Microsoft Excel and Power BI, 5th edition; Conrad G. Carlberg; Pearson  
Data Analytics with R; Bharti Motwani; Wiley