Semester	**THREE**
Paper Number	**11 B**
Paper Code	**MDTS 4313**
Paper Title	**Advanced Regression Techniques**
No. of Credits	**3**
Course description	2 Theory + 2 Practical Classes/ week
Course Objective	**Advanced Regression Techniques** At the end of course, a student is expected to : 1. Build regression models on data when classical assumptions on the response cannot be made. 2. To be able to identify non-linear relations between the response and predictors and fit them on the given data. 3. To overcome the difficulties of polynomial regression and improve upon it by the use of splines. 4. To assess the stability of regression coefficients in a regression model through bootstrapping. 5. To be able to extend non-linear relationships to arbitrary and flexible functions using a Generalized Additive Model.
Syllabus	**Advanced Regression Techniques:** **Smoothing Techniques:** Scatterplot Smoothing. Different types of smoothers. Kernel Smoothing. Selection of smoothing parameters. **Regression Splines:** Simple knot selection schemes. Adaptive knot selection schemes. Adaptive regression splines. MARS. **Generalized Additive Models:** Additive Models, GAM. Scoring Techniques. Estimation of link function. Analysis of Deviance. Transformation of Response – ACE algorithm and generalization of Box Cox transformation. **Nonlinear Regression:** Fixed and Random regressor models. Least Squares and Maximum Likelihood Estimation. Idenfiability and Ill conditioning problems. Residual Analysis. **Bootstrapping:** Parametric and nonparametric bootsrapping in linear regression models.
List of Practical	Based on the theory topics
Reading/Reference Lists	**Advanced Regression Techniques:** 1. P.J. Green and B.W. Silverman : Nonparametric Regression & Generalized Linear Models 2. M.P. Wand and M.C. Jones : Kernel Smoothing 3. T. Hastie and R.Tibshirani : Generalized Additive Models 4. G. Seber and C. Wild : Nonlinear Regression
Evaluation	
Advanced Regression Techniques	

Theory	Practical
CIA: 5	Continuous Assessment: 15
End Sem Exam: 25	End Sem Viva: 5
Total : 30	Total: 20
Paper Structure	
Advanced Regression Techniques	
5 Marks question: 1 out of 2	
10 Marks question: 2 out of 3	