Semester	**THREE**
Paper Number	**12**
Paper Code	**MDTS 4314**
Paper Title	**Time Series**
No. of Credits	**6**
Course description	DSE Composite Paper One Module. Applications Using R No. of classes assigned Theory: 4 classes per weekPractical: 3 classes per week
Course Objective	**Course Outcome:** • To identify the appropriate time series model for a given data series • To smooth a time series using classical and exponential smoothing techniques • To model the process mean using the Boss Jenkins technique • To forecast future values • To evaluate the accuracy of predictions using various metrics • To model the variability in a time series using ARCH-GARCH models • To predict model volatility • To model structural breaks in time series • To set up latent time series models through state space modeling • To analyze time series using the frequency domain approach
Syllabus	**Unit 1: Univariate time series modelling and forecasting:** Different components of a time series. Analysis of trend and seasonality. Exponential smoothing. Stationarity. The autocorrelation and partial autocorrelation functions. Moving Average, Autoregressive, and Autoregressive Moving Average processes. ARIMA and SARIMA models. Dickey-Fuller and Augmented Dickey Fuller tests for unit roots. Tests for Randomness. Building the ARIMA model: the Box--Jenkins approach. (18) **Unit 2: Modelling volatility** Models for volatility, Autoregressive conditionally heteroscedastic (ARCH) model, Generalised ARCH (GARCH) models, Variants of the GARCH model. Estimation of ARCH/GARCH models, Building the ARCH/GARCH model. Volatility forecasting. (12) **Unit 3: Switching models, State Space Models and Frequency Domain Analysis** Piecewise Linear Models, Markov switching models, Threshold autoregressive models: estimation and specification tests. State Space Models and its estimation. Kalman Filtering. Analysis in the Frequency Domain: Spectral density function. Periodogram Analysis. (18)

List of Practical	Based on the theory Topics	
Reading/Reference Lists	1.C. Chatfield : The Analysis of Time Series – An Introduction 2.G.E.P. Box ,G.M. Jenkins &G.C.Reinsel : Time Series Analysis – Forecasting & Control 3.P.J. Brockwell & R.A. Davis : Introduction to Time Series Analysis and Forecasting 4.A.Pankratz : Forecasting with Univariate Box-Jenkins Model 5.G. Janacek and L. Swift : Time Series –Forecasting, Simulation, Application 6. R.H. Shumway & D.S. Stoffer : Time Series Analysis and its Applications 7.Chris Brooks: Introductory Econometrics for Finance 8. C. Gourieroux & A. Monfort : Time Series and Dynamic Models	
Evaluation	Theory CIA: 10 End Sem Exam: 50 Total : 60	Practical Continuous Assessment: 30 End Sem Viva: 10 Total: 40
Paper Structure for End Semester Theory	Short questions: 5 marks each	Long questions: 10 marks each
	2 out of 4	4 out of 6