

20BSP---					Time Series Analysis					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
					25	50	25	--	--	100

## COURSE OBJECTIVES

- ☐ To introduce the concept of random variables and central limit theorem.
- ☐ To introduce the basic concept of time series and the concept of correlogram.
- ☐ To introduce various probability models for modelling time series.
- ☐ To introduce the concept of ergodicity used for model building from single time series.
- ☐ To introduce the method of estimation of parameters for various models.
- ☐ To introduce the methods of forecasting using the various time series models.

### UNIT 1 Review of random variables and introduction to time series

10 Hrs.

Review of Probability theory and random variables, joint distribution, central limit theorem, Introduction to Time series: Examples, simple descriptive techniques, trend, seasonality, the correlogram, correlogram behaviour for data with pure random numbers, trend and periodicity.

### UNIT 2 Probability models for time series.

10 Hrs.

Probability models for time series: stationarity process, weak stationarity, second-order stationary process, properties of autocorrelation function, purely random process, random walk model, Moving average (MA) process, Autoregressive (AR) process, ARMA and ARIMA models.

### UNIT 3 Parameter estimation for time series models

10 Hrs.

Estimating the autocovariance and autocorrelation function, using correlogram in modelling, ergodicity, fitting an autoregressive process and estimation of parameters, fitting a moving average process and estimation of parameters, estimating parameters for ARMA and fitting ARIMA models, Box-Jenkins, seasonal ARIMA models

### UNIT 4 Introduction to Forecasting

10 Hrs.

Introduction to forecasting, forecasting in univariate processes, extrapolation of trend, simple exponential smoothing, Holt-Winters forecasting procedures, Box-Jenkins procedure, Other methods, Prediction intervals. Multivariate procedures, multiple regression, econometric models. Examples, Prediction Theory.

## COURSE OUTCOMES

On completion of the course, student will be able to

- CO1 – Understand the concept of random variables and central limit theorem.
- CO2 – Understand the basic concept of time series and the concept of correlogram.
- CO3 – Understand the various probability models for modelling time series.
- CO4 – Understand the concept of ergodicity used for model building from single time series.
- CO5 – Understand the method of estimation of parameters for various models.
- CO6 – Understand the methods of forecasting using the various time series models.

## TEXT/REFERENCE BOOKS

1. Chris Chatfield, "The Analysis of Time Series: An Introduction", 6th edition, Chapman and Hall / CRC, 2003.
2. William Wei, "Time Series Analysis: Univariate and Multivariate Methods", 2nd edition, Pearson/Addison Wesley, 2006.
3. R. H. Shumway and D. S. Stoffer, "Time Series Analysis and Its Applications: With R Examples", 2nd edition, , 2006.
4. James D. Hamilton, "Time Series Analysis", Princeton, NJ: Princeton University.
5. James D. Hamilton, "Time Series Analysis", Princeton, NJ: Princeton University Press, 1994.

## END SEMESTER EXAMINATION QUESTION PAPER PATTERN

**Max. Marks: 100**

Part A/Question: <Details>

Part B/Question: <Details>

**Exam Duration: 3 Hrs**

<> Marks

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