Time Series Analysis

Course Code:		Year:	III	Semester:	I
Course Category:	Honors	Branch:	CSE	Course Type:	Theory
Credits:	4	L-T-P:	4-0-0	Prerequisites:	-
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

COURSE OUTCOMES		
Upon successful completion of the course, Student will be able to		
CO1	Understand the fundamental concepts of Time Series Analysis.	**L2**
CO2	Apply suitable autoregressive processes on Stationary/ Non-stationary Time Series models for noise reduction.	**L3**
CO3	Apply Minimum Mean Square Error techniques for time series forecasting.	**L3**
CO4	Analyze the given scenario and use autoregressive models for time series prediction.	**L4**

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	√													
CO2	√								√	√				√
CO3	√								√	√				√
CO4		√							√	√				√

SYLLABUS

Unit No.	Contents	Mapped CO
I	**Fundamental Concepts** Stochastic Processes, The Autocovariance and Autocorrelation Functions, The Partial Autocorrelation Function, White Noise Processes, Estimation of the Mean, Autocovariances, and Autocorrelations: Sample Mean, Sample Autocovariance Function, Sample Autocorrelation Function, Sample Partial Autocorrelation Function; Moving Average and Autoregressive Representations of Time Series Processes.	**CO1, CO2**
II	**Stationary Time Series Models** Autoregressive Processes: The First-Order Autoregressive AR(1) Process, The Second-Order Autoregressive AR(2) Process, The General pth-Order Autoregressive AR(p) Process; Moving Average Processes: The First-Order Moving Average MA(1) Process, The Second-Order Moving Average MA(2) Process.	**CO1, CO2**
III	**Nonstationary Time Series Models** Nonstationarity in the Mean: Deterministic Trend Models, Stochastic Trend Models and Differencing; Autoregressive Integrated Moving Average (ARIMA) Models: The General ARIMA Model, The Random Walk Model, The ARIMA(0, 1, 1) or IMA(1,1) Model.	**CO1, CO2**
IV	**Forecasting** Introduction, Minimum Mean Square Error Forecasts: Minimum Mean Square Error Forecasts for ARMA Models, Minimum Mean Square Error Forecasts for ARIMA Models; Computation of Forecasts.	**CO1, CO3**
V	**Model Identification** Steps for Model Identification, Empirical Examples, The Inverse Autocorrelation Function (IACF), Extended Sample Autocorrelation Function and Other Identification Procedures: The Extended Sample Autocorrelation Function (ESACF), Other Identification Procedures.	**CO1, CO4**

Learning Resources

Text Books

1. Time Series Analysis, Wei, William WS. Second Edition, 2006, Pearson.

References

1. Time Series Analysis, Hamilton, James Douglas, 2020, Princeton university press.
2. Forecasting: Principles And Practice, Hyndman, Rob J., and George Athanasopoulos. 2018, OTexts.

e-Resources and other Digital Material

1. https://www.coursera.org/learn/practical-time-series-analysis
2. https://nptel.ac.in/courses/103106123
3. https://www.youtube.com/watch?v=Aw77aMLj9uM