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 (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3								2	2				3
CO3	3								2	2				3
CO4		3							2	2				3

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