

Course: Time series Analysis

Course Code: 21VBB7D501

Section – B

Answer any 4 of the following questions

(5M x 4Q = 20)

SET 1			
Sl. No,	Question	Unit	CO
1	Explain the concept of "Forecasting Range" in the context of time series analysis. Why is it crucial to carefully select an appropriate forecasting range when working with historical data?	Unit 5: Forecast - II	3
2	Explain the concept of "Exponential Smoothing" in time series forecasting. What is the basic idea behind Simple Exponential Smoothing, and how does it work to make forecasts?	Unit 7: Exponential Smoothing - II	2
3	Critically evaluate the limitations and advantages of using exponential smoothing models in comparison to other forecasting techniques, such as ARIMA (AutoRegressive Integrated Moving Average). Provide a nuanced discussion on scenarios where exponential smoothing might excel or fall short compared to ARIMA	Unit 7: Exponential Smoothing - II	2
4	Investigate the influence of seasonality on autocorrelation within a time series dataset. Provide a step-by-step analysis of how to detect and handle seasonality in autocorrelation plots. Substantiate your explanation with a practical example using Python.	Unit 8: Autocorrelation	3
5	Describe the various types of data used in time series analysis, with a focus on time series data. What distinguishes time series data from other types of data?	Unit 1: Introduction to Time Series Analysis - I	4
6	Justify the need to decompose time series data.	Unit 3: Decomposition of Time Series	1

SET 2			
Sl. No,	Question	Unit	CO

1	Describe Average Forecasting and Moving Average Forecasting. For each technique, outline the basic methodology and discuss scenarios where they are most suitable for making forecasts.	Unit 5: Forecast - II	2
2	Describe the Double Exponential Smoothing technique in time series forecasting. How does it differ from Simple Exponential Smoothing, and why is it more suitable for datasets with a trend component?	Unit 7: Exponential Smoothing - II	3
3	Compare and contrast the impact of different parameter choices, such as varying smoothing factors, on the accuracy and responsiveness of exponential smoothing models in forecasting. Provide examples to support your analysis.	Unit 7: Exponential Smoothing - II	3
4	Assess the utility of autocorrelation and partial autocorrelation plots in identifying and interpreting temporal patterns within time series data. Explain how these plots aid in understanding and modeling serial dependencies.	Unit 8: Autocorrelation	2
5	Define the concept of "forecasting" and discuss its importance in various domains. Why do businesses and organizations rely on forecasting?	Unit 1: Introduction to Time Series Analysis - I	1
6	Explain the components of time series data, including trend, seasonality, and noise. How do these components influence the forecasting process, and why is it essential to understand and model them appropriately?	Unit 2: Introduction to Time Series Analysis - II	1

SET 3			
Sl. No,	Question	Unit	
1	Discuss the importance of model validation in the context of forecasting. What are the key steps and metrics involved in validating a forecasting model's performance?	Unit 5: Forecast - II	2
2	Discuss the concept of Exponential Smoothing with seasonality, specifically focusing on the Holt-Winters model. What are the key components of the Holt-Winters model, and how does it handle data with both trend and seasonality?	Unit 7: Exponential Smoothing - II	3
3	Devise a strategic plan for a manufacturing company to utilize autocorrelation analysis in optimizing inventory management. Explain how autocorrelation analysis of historical sales data can assist in determining inventory stocking levels, especially	Unit 8: Autocorrelation	5

	considering seasonality and demand patterns.		
4	Critically assess the implications of choosing an inappropriate smoothing parameter in an exponential smoothing model. Provide examples or case studies illustrating the consequences of selecting overly high or low values for the smoothing factor (alpha) on forecast accuracy and reliability.	Unit 7: Exponential Smoothing - II	3
5	Explore the applications of time series analysis across different fields.	Unit 1: Introduction to Time Series Analysis - I	1
6	Describe the fundamental differences between the Additive and Multiplicative models in classical time series decomposition.	Unit 3: Decomposition of Time Series	1