SRN | | | | | | | | | | | |

PES UNIVERSITY	**PES University, Bengaluru** (Established under Karnataka Act No. 16 of 2013)	**UE20CS934**

July 2024: END SEMESTER ASSESSMENT (ESA)
M TECH DATA SCIENCE AND MACHINE LEARNING_ SEMESTER II

UE20CS934 – Time Series Forecasting

Time: 3 Hrs	Answer All Questions	Max Marks: 100

INSTRUCTIONS

- All questions are compulsory.
- Section A should be handwritten in the answer script provided
- Section B and C are coding questions which have to be answered in the system.

Section A (20 marks)

1	a)	Explain the main components of a time series. How do these components affect the analysis of a time series? Provide examples where applicable.	5
	b)	Define stationarity in the context of time series analysis. Why is it important for a time series to be stationary? Describe the process of differencing and how it helps in achieving stationarity.	7
	c)	What is the role of moving average in time series analysis? Explain how the Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) are used in identifying the order of an ARIMA model.	8

Section B (40 marks)

2	Your task is to analyze the electricity demand to better understand consumption patterns over time. For this, we have gathered demand data for the period of January 2015 to December 2016. • **date**: The date of the recorded demand (in the format `yyyy-mm-dd`). • **demand**: The electricity demand on a particular day (numeric, measured in megawatts). The dataset includes daily records of electricity demand over the specified period. This data can be useful for analyzing trends, forecasting future demand, and understanding seasonal variations in electricity usage.	

SRN | | | | | | | | | | | |

	a)	Read the dataset (tab, csv, xls, txt, inbuilt dataset). What are the number of rows and no. of cols & types of variables? (2 mark) Convert the data into time series (3 marks) Check for defects in the data such as missing values, null, etc. (2 mark) Visualize the time series using relevant plots. (3 mark)	10
	b)	Decompose the time series and check for components of time series. (4 marks) Perform dicky fuller test to check the stationarity? What other actions will you take if series is non-stationary? (3+2 marks) Plot Auto Correlation and Partial Auto Correlation function? What is your inference from these plots? (3+3 marks)	15
	c)	Split dataset into train and test sets. Use last two months of data for testing. (5 marks) Fit ARIMA model and observe the RMSE and MAPE values of the model for test data.(10 marks)	15
Section C (40)			
3	a)	Fit exponential smoothing model and observe the residuals, RMSE and MAPE values of the model for test data. (15 marks) marks	15
	b)	How would you improve the exponential smoothing model? Make the changes and fit the final exponential smoothing model. (10 marks) Analyze the residuals of this final model. Feel free to use charts or graphs to explain. (5 marks)	15
	c)	Forecast the Avg Spending price for next 1 month using the final model? (10 marks)	10