


SRN

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

	<p align="center">PES University, Bengaluru (Established under Karnataka Act No. 16 of 2013)</p>	<p align="center">UE20CS934</p>
March 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			
<ul style="list-style-type: none"> 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)	Define and explain the components of a time series decomposition.	6
	b)	Why is stationarity important in time series analysis? Provide methods for testing stationarity, also explain how does differencing help in making a time series stationary?	6
	c)	How will you determine the order of a moving average process? Explain.	8
Section B (40 marks)			
2	<p>Given Shampoo Sales Dataset with following information.</p> <p>Data refers from Jan 2001 to Dec 2003.</p> <p>This dataset describes the monthly number of sales of shampoo over a 3-year period.</p> <p>The units are a sales count and there are 36 observations.</p> <p>Month = date field ==> First entry in Month column 1-01 indicates Year 2001-Month 01 etc.</p> <p>Sales = numeric field</p>		
	a)	What are the number of rows and no. of cols & types of variables? (1 mark) Convert the data into time series (4 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)	15

SRN

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

		Plot Auto Correlation and Partial Auto Correlation function? What is your inference from these plots? (3+3 marks)	
	c)	Divide the data in 70:30 in train and test Use test data for testing. (3 marks) Fit ARIMA model and observe the RMSE and MAPE values of the model for test data. (12 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
	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 6 months using the final model?	10