MASTER'S DEGREE (C.S.S) EXAMINATION, NOVEMBER 2024
2023 ADMISSIONS REGULAR
SEMESTER III - CORE COURSE
ST3C14TM - Time Series Analysis

Time : 3 Hours   Maximum Weight : 30

Part A

I. Answer any Eight questions. Each question carries 1 weight   (8x1=8)

1. Define Simple Exponential Smoothing.

2. State the purpose of differencing in time series. Explain the process of differencing.

3. Define ARIMA(p, d, q) model.

4. Define partial autocorrelation function of stationary stochastic process.

5. Define the moving average MA model.

6. Define residuals and its uses in time series analysis.

7. List the four main steps of model building in time series analysis.

8. Describe the maximum likelihood method of estimation of the parameters of an AR(1) model.

9. Define periodogram.

10. State and show that the spectral density of a white noise sequence is constant for all

$$\omega \in (\frac{-1}{2}, \frac{1}{2}]$$

Part B

II. Answer any Six questions. Each question carries 2 weight   (6x2=12)

11. Describe the method of Differencing. How can it be used to find the degree of the polynomial fitted for trend component?

12. Describe the method of 'Moving Average' in time series analysis.

13. Describe the invertibility condition for an AR(p) process.

14. Discuss Invertibility Conditions for a Linear Process.

15. Discuss the Yule-Walker and least squares ARMA estimators.

16. Discuss the relation between Ordinary Least Square and Maximum Likelihood estimation for an AR(p) model.

17. Discuss how the analysis of time series help business forecasting?

18. Show that ARMA(1,1)process $X_t = 0.5X_{t-1} + e_t - 0.3e_{t-1}$ is stationary and invertable

Part C

III. Answer any Two questions. Each question carries 5 weight   (2x5=10)

19. Define time series and explain the four components of time series analysis.

20. Explain the methods of estimation of seasonality in a given time series.

21. Discuss the steps to be followed in working with an ARMA model in Box-Jenkins methodology.

22. Discuss how the periodogram helps to determine the periodicity hidden in a time series.