22/10/25

TM253798N

Reg. No :.....

Name :.....

MASTER'S DEGREE (C.S.S) EXAMINATION, OCTOBER 2025

2024 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. Write a note on double exponential smoothing.
2. What do you mean by the trend component of a time series data. Give examples.
3. Define the moving average MA model.
4. State Causality and Invertibility conditions for general linear process.
5. Define autocorrelation function and two of its properties.
6. Explain the stages in ARIMA modelling.
7. Interpret ARIMA (0, 1, 0).
8. State the invertibility condition for ARMA(p,q).
9. Define periodogram.
10. Define SARIMA stating an example with a data involving seasonal variation.

Part B

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

11. Differentiate between Simple Exponential Smoothing and Holt's Smoothing.
12. Describe the method of Differencing. How can it be used to find the degree of the polynomial fitted for trend component?
13. Derive the stationarity conditions for an AR(p) process.
14. Explain Yule-Walker equations.
15. Explain the concept of diagnostic checks for models before forecasting the data.
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. (i) Explain the components of time series. (ii) Describe Holt-Winters smoothing procedure.
20. Derive the Yule-Walker equations satisfied by the ACF of an AR(p) process.

21. Explain the statistical test to check the stationarity in time series.

22. (a) Find the ACVF for the time series $X_t = Z_t + 0.3Z_{t-1} - 0.4Z_{t-2}$, where Z_t is a white noise time series with mean 0 and variance 1.

    (b) Find the ACVF for the time series $Y_t = W_t - 1.2W_{t-1} - 1.6W_{t-2}$, where W_t is a white noise time series with mean 0 and variance 0.25.

    (c) Comment on the comparison of results you obtained from your results for the part (a) and (b).