

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2024**(Supplementary-2021 Admission)****STATISTICS****FMST3E11 – TIME SERIES ANALYSIS****Time: 3 Hours****Maximum Weightage: 30****Part A: Answer any *four* questions. Each carries *two* weightage.**

1. List the four components of a time series. Explain a method used to detect seasonality.
2. Define Exponential Smoothing and Double Exponential Smoothing.
3. Differentiate between weak stationarity and strong stationarity.
4. State the concepts of invertibility and stationarity in the context of an AR(1) process.
5. Define an ARIMA(0,1,1) model.
6. State Herglotz's theorem and discuss its significance in time series analysis.
7. Compare the ARCH and GARCH models.

(4 × 2 = 8 weightage)**Part B: Answer any *four* questions. Each carries *three* weightage.**

8. Describe the method of Adaptive Smoothing.
9. Explain how to fit a linear trend to a time series when seasonality is present.
10. Define the invertibility of a time series. Derive the conditions for the invertibility of an MA(p) process.
11. Derive the Yule-Walker equations for a stationary AR(p) process.
12. Explain the Box-Jenkins methodology for identifying and fitting a suitable time series model.
13. What is a non-linear time series model? Provide an example and explanation.
14. Define the Periodogram and Correlogram. Explain how they can be used to identify appropriate linear models for time series data.

(4 × 3 = 12 weightage)**Part C: Answer any *two* questions. Each carries *five* weightage.**

15. Describe the Holt-Winter's smoothing method and explain how it is used for forecasting.
16. Provide a brief overview of residual analysis and diagnostic checking in the context of ARMA(p,d,q) models.
17. Explain the spectral analysis of time series and derive the spectrum for an ARMA process.
18. Define the ARCH model and its key properties. How can we test for the ARCH effect? Outline the steps involved in building a volatility model.

(2 × 5 = 10 weightage)