

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2025
(Regular/Improvement/Supplementary)

STATISTICS
FMST4E11- TIME SERIES ANALYSIS

Time: 3 Hours**Maximum Weightage: 30****Part A: Answer any *four* questions. Each carries *two* weightage.**

1. Define time series and explain its importance in statistical analysis.
2. Consider $x_t = x_{t-1} + 0.5x_{t-2} + z_t$. Is this process stationary?
3. Explain simple exponential smoothing.
4. What is the spectral density of a time series? How does it help in understanding the frequency components of a time series?
5. What do you mean by stationary time series?
6. What is residual analysis in the context of ARMA modeling?
7. Introduce non-linear time series models. How do they differ from linear models?

(4 × 2 = 8 weightage)

Part B: Answer any *four* questions. Each carries *three* weightage.

8. What are the properties of an autocorrelation function?
9. Explain briefly about the different models that we use in Box Jenkins methodology.
10. Explain different forecasting methods of a time series data.
11. Derive the autocorrelation function of a $MA(q)$ process.
12. Discuss unit root test for stationarity.
13. Explain Holt-Winter smoothing of time series data.
14. Explain Portmanteau test.

(4 × 3 = 12 weightage)

Part C: Answer any *two* questions. Each carries *five* weightage.

15. Discuss ARCH and GARCH models. What is their significance in modeling volatility and heteroscedasticity in time series data?
16. Explain the concept of stationarity in the context of AR, MA, and ARMA models. How does stationarity affect model fitting?
17. Explain in detail various methods for determining trend in a time series.
18. Discuss the diagnostic checking procedures for ARMA models. What tests are commonly used to validate the model?

(2 × 5 = 10 weightage)