THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

(Improvement/Supplementary)

STATISTICS

FMST3E11 – TIME SERIES ANALYSIS

Time: 3 Hours   **Maximum Weightage: 30**

Part A: Answer any *four* questions. Each carries *two* weightage.

1.   What does it mean to claim that a time series is a discrete-time stochastic process?

2.   Derive the Mean and Variance of a Stationary Process.

3.   Differentiate between Auto-Covariance and Auto-Correlation functions. Use an example to demonstrate.

4.   Explain the model of the Non-stationary First-Order Autoregressive Process.

5.   Demonstrate the forecasting using ARIMA models.

6.   What is the difference between periodogram and spectrogram?

7.   What are the uses of computer packages like R for time-series analysis? Write any two R packages that are used for time-series analysis.

(4 × 2 = 8 weightage)

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

8.   What is meant by autoregressive integrated moving average? Define its linear model.

9.   Derive the stationarity conditions for autoregressive processes.

10. Describe least squares estimation for ARMA processes.

11. Estimate Auto-covariance and auto-correlation function under large samples theory.

12. Define weakly stationary process. Explain Spectral analysis of the weakly stationary process.

13. Explain ARCH and GARCH models.

14. State and prove Herglotzic Theorem.

(4 × 3 = 12 weightage)

(P.T.O.)

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

15. Describe exponential, moving average and Holt-Winter smoothings.

16. Define ARMA(p, q) model. Derive the relationships between the ψ Weights and the π Weights.

17. Explain the recursive method for calculating estimates of autoregressive parameters.

18. Describe the various approaches for residual analysis and diagnostic checks in time series analysis.

(2 × 5 = 10 weightage)