

16P361

(Pages: 2)

Name.....

Reg. No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, OCTOBER 2017

(Regular/Supplementary/Improvement)

(CUCSS - PG)

CC15P ST3 E06 - TIME SERIES ANALYSIS

(Statistics)

(2015 Admission Onwards)

Time : Three Hours

Maximum : 36 Weightage

PART A

(Answer *all* questions. Weightage **1** for each question.)

1. Describe the components of a time series.
2. Define autocorrelation function. Mention any two uses of it.
3. Explain how will you test for trend in a given time series.
4. What are the main differences between moving average and exponential smoothing methods?
5. Define an ARMA(p, q) model and state the conditions for its stationarity.
6. Obtain the auto correlation of $X_t = \epsilon_t - 0.5\epsilon_{t-1}$, where $\{\epsilon_t\}$ is a white noise process with mean zero and variance σ^2 .
7. Obtain the Yule-Walker equations of AR(2) model.
8. Explain the role of residuals in time series forecasting.
9. Obtain the spectral density of a stationary AR(1) process.
10. Explain a non-linear time series model with an illustrative example.
11. Define periodogram in time series analysis. How do you interpret it?
12. Define ARCH models. What is its role in the analysis of time series data?

(12 x 1 = 12 Weightage)

PART B

Answer *any eight* questions. Weightage **2** for each question.)

13. Describe Holt method of smoothing.
14. What is meant by seasonality in time series? How do you identify and test for seasonality in time series analysis?
15. Distinguish between weak stationarity and strict stationarity in time series. Discuss on the stationarity of $\{Z_t\}$ defined by $Z_t = A \cos \theta t + B \sin \theta t$, where A and B are uncorrelated Uniform(0,1) random variables.
16. Stating the required conditions prove that AR process can be written as a MA process of infinite order.

17. Describe the different steps in identifying and fitting an AR(p) model to a time series data.
18. Derive the conditions for stationarity of an AR(2) model.
19. Obtain the Yule Walker equations for MA(q) process.
20. Discuss on the estimation of mean and autocovariance function under large sample theory.
21. Derive the spectrum of ARMA(p,q) model. Hence obtain spectrum of MA(1) model..
22. Write a short note on diagnostic check in time series analysis.
23. Derive an 1-step ahead forecasting formula for ARIMA(2,1,1) model using difference equation form.
24. Define GARCH model. State the conditions for its stationarity. Highlight its application in time series analysis.

(8 x 2 = 16 weightage)

PART C

(Answer *any two* questions. Weightage **4** for each question.)

25. Describe single and double exponential smoothing methods.
26. Explain the method of finding autocorrelation of ARMA(p,q) model. Deduce the autocorrelation of AR(2) process.
27. State and prove Herglotz theorem.
28. Find the maximum likelihood estimates of the parameters of ARMA(1,1) model assuming that errors are normally distributed.

(2 x 4 = 8 Weightage)
