15P357 (Pages: 2) Name……..

Reg. No……..

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOV. 2016

(CUCSS - PG)

(Statistics)

CC15P ST3 E06 - Time Series Analysis

(2015 Admission)

Time : Three Hours Maximum : 36 Weightage

PART A

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

1. Define a time series and relate it with a discrete parameter stochastic process.
2. Define autocorrelation and auto covariance function of a time series.
3. What is spectral density function? What are its important properties?
4. Define a Moving Average model of order q (MA(q)) and find the autocorrelation of MA(1) model.
5. Explain an autoregressive integrated moving average model. Write the form of an ARIMA(1,1,1) model.
6. Discuss on the stationarity of AR(1) model.
7. Obtain the spectral density of a first order moving average process.
8. Explain how differencing effects forecasting of a time series.
9. Obtain the ACF of an AR(1) process.
10. Explain a non-linear time series model with an illustrative example.
11. What is the role of periodogram in estimating spectral density?
12. Define ARCH model. Give an example to show its application in financial time series analysis.

(12 x 1 = 12 Weightage)

PART B

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

13. Describe exponential smoothing method in the analysis of time series data.
14. Illustrate the moving average method of smoothing technique with an example. What are the characteristics and limitations of this method?
15. Derive the autocorrelation of $\{Y_t\}$, where $Y_t = \epsilon_t - \epsilon_{t-1} + 0.6\ \epsilon_{t-2}$ assuming $\{\epsilon_t\}$ as a white noise process.

16. For the AR(1) model $X_t = 0.5\, X_{t-1} + \epsilon_t$, show that $X_t = 10(0.5)^t + \epsilon_t + 0.5\ \epsilon_{t-1} + 0.5^2\ \epsilon_{t-2} + \ldots$ is a solution. Is it a stationary process?
17. Explain the method of finding the order of ARIMA(p,d,q) model in the analysis of a time series data.
18. Obtain Yule-Walker equation for a stationary AR (p) process.
19. Describe the role of residual analysis in model checking.
20. Discuss on the estimation of mean and autocovariance function under large sample theory.
21. Discuss the asymptotic properties of the maximum likelihood estimates of the parameters of ARMA model.
22. Describe the structure of correlogram of a (i) Stationary series (ii) Non stationary series.
23. Find the spectrum of an ARMA (p,q) model..
24. Define a GARCH(1,1) model and describe its properties.

(8 x 2 = 16 weightage)

PART C

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

25. Explain Holt winters smoothing method for multiplicative seasonality.
26. Define an ARMA(p, q) model and obtain the conditions for its stationarity.
27. Describe the least square estimation method of finding the parameter estimates of ARMA(p ,q) model.
28. State and prove Herglotz theorem.

(2 x 4 = 8 Weightage)

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