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D 91631 (Pages : 2) Name..............................

Reg. No..............................

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2015

(CUCSS)

Statistics

ST 3E 06—TIME SERIES ANALYSIS

(2010 Admission onwards)

Time : Three Hours Maximum : 36 Weightage

Section A

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

1. Explain the steps involved in moving average method of smoothing a time series.
2. Define autocorrelation and autocovriance functions of a time series.
3. Justify the statement "Observe time series is a realization of some discrete parameter stochastic process".
4. What is an adaptive smoothing ?
5. What is World representation of weakly stationary time series ?
6. Obtain the ACF of an AR (1) process.
7. Find the Yule-Walker estimate of θ in an invertible MA (1) model : $X_t = \theta a_{t-1} + a_t$.
8. List different explicite forms of forecasts in time series.
9. What do you mean by minimum mean square error forecasts ?
10. Obtain the spectral density of a first order moving average process.
11. Propose an estimator for spectral density of a weakly stationry time series and state its properties.
12. When do you say that a time series model is non-linear ? Explain with an example.

(12 × 1 = 12 weightage)

Section B

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

13. Explain the method of fitting a quadrtic trend for a time series in the presence of seasonality.
14. How do check the stationarity of an observed time series ? Justify the method of differencing for obtaining a stationary version of a time series.
15. When do you say that a time series is invertible ? Obtain the conditions for invertibility of an MA (2) process.

Turn over

16. If $X_t = \alpha X_{t-1} + a_t$ at is a first order autoregressive model in which $\{a_t\}$ is a sequence of independent and identically distributed standard normal random variables, then show that $\{X_t\}$ is a Markov sequence.

17. Define an ARIMA (0, 1, 1) model and express its inverted form as an exponentially weighted moving average model.

18. Obtain the Yule-Walker equations for a stationary AR (p) process.

19. Describe Durbin-Leninson algorithm for computing partial autocorrelation functions.

20. Obtain the least squares estimates of μ and α in a stationary AR (1) model defined by $X_{t-\mu} = \alpha(X_{t-1} - \mu) + a_t$, where $\{a_t\}$ is a white noise sequence.

21. Describe Ljung-Box test for model diagnosis in time series.

22. Express the autocovariance function of a weakly stationary time series in terms of the spectral distribution and show tht it is non-negative definite.

23. Explain why Box-Jenkin's methods are not suitable for analyzing financial time series.

24. Define ARCH (p) process and obtain the kurtosis of ARCH (1) process.

(8 × 2 = 16 weightage)

Section C

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

25. Describe Holt's method of smoothing non-seasonal time series. How do you determine the smoothing constants ?

26. Define an ARMA (p, q) model and obtain the conditions for its stationarity.

27. Describe the conditional maximum likelihood method for estimating the parameters of a stationary ARMA (1, 1) model.

28. State and prove Herglotz theorem.

(2 × 4 = 8 weightage)