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1104E139

Candidate's Seat No :________

M.Sc. Sem.-4 Examination

507

Statistics

April-2025

Time : 2-30 Hours] **[Max. Marks : 70**

Note: Attempt all questions.

Q.1

(i) Explain the term 'cyclical component of a time series'. Explain any procedure known to you for detecting the presence of a cyclical component. [7]

(ii) What is a periodogram? Explain the relationship between periodogram and correlogram. [7]

OR

(i) Define time series. Write objectives and main components of time series. [7]

(ii) Explain Variate Difference Method of a time series. [7]

Q.2

(i) Explain correlogram of Moving Average. [7]

(ii) Let ε_t , ε_{t+1}, $\cdots$ and ξ be independent variables with zero mean and unit variance. Making $y_t = a\xi + \varepsilon_t$, $-\infty < t < \infty$, show that the process is stationary with correlation

$$\rho_1 = \rho_2 = \cdots = \frac{a^2}{1+a^2}.$$ [7]

OR

(i) Obtain the correlogram of the harmonic series. [7]

(ii) What is ACF and PACF? How they help in time series analysis? [7]

Q.3

(i) Explain Random Walk Model with drift. [7]

(ii) Explain Dickey-Fuller test for testing stationarity of the given time series. [7]

OR

(i) Explain Random Walk Model without drift. [7]

(ii) Explain "Unit Root Stochastic Process". [7]

Q.4

(i) Explain Box-Jenkin's methodology. Write its limitations and importance. [7]

(ii) Explain AR and MA process of time series data. [7]

OR

(i) Explain ARMA and ARIMA process of time series data. [7]

(ii) What are the differences between Box-Jenkins and VAR approaches to economic forecasting? [7]

(P.T.O)

E 139-2

Q. 5 Answer any seven: [14]

(i) Define stationary stochastic process.

(ii) 'Residual Method' is used for measuring cyclical variations.
(a) True (b) False

(iii) In the Variate Difference Method for testing the homogeneity of two successive estimates of the variance V
(a) Fisher's F test cannot be applied (b) Fisher's F test can be applied
(c) Student's t test can be applied (d) Student's t test cannot be applied

(iv) In time series analysis, what does the "autocorrelation function"(ACF) measure?
(a) Seasonal patterns (b) Trend patterns
(c) Correlation between lagged values (d) Random noise

(v) Which type of time series data is characterized by data points that are dependent on previous observations?
(a) White noise (b) Stationary data (c) Autoregressive data (d) Independent data

(vi) What does auto covariance measure?

(vii) A time series data is a set of data recorded at
(a) Periodically (b) Successive point of time (c) Time or space intervals (d) all the above

(viii) What is the primary goal of "differencing" in time series analysis?
(a) To remove seasonality from the data (b) To remove outliers from the data
(c) To identify trends in the data (d) To make the data stationary

(ix) Correlogram is
(a) test statistics used to test the chosen ARIMA model for goodness of fit
(b) plots of autocorrelation function and partial autocorrelation function against lag length
(c) plots of autocorrelation function and partial autocorrelation function against time
(d) plots of error term against time

(x) When Y depends on current and previous time period error term, it is a
(a) AR(1) model
(b) MA(1) model
(c) ARMA (1,1) model
(d) single equation model

(xi) The model where the value of Y depends only on its value in the previous time period and a random term is
(a) single equation model
(b) AR(1) model
(c) MA(1) model
(d) ARMA (1,1) model

(xii) ARIMA (1,2,3) means
(a) the series has to be first differenced to make it stationary
(b) the series has to be differenced twice to make it stationary
(c) the series has to be differenced thrice to make it stationary
(d) can't say about the stationary condition from the given information

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