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5 SEM TDC DSE STS (CBCS) 2 (H)

2021

(Held in January/February, 2022)

STATISTICS

(Discipline Specific Elective)

(For Honours)

Paper : DSE–2

(Time Series Analysis)

Full Marks : 50
Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the given alternatives in each : 1×5=5

(a) The component of time series responsible for the case of bank clearings and bank deposits is

(i) secular trend

(ii) seasonal variation

(iii) cyclical variation

(iv) random component

(b) Moving average method gives a correct picture of the long-term trend of the series if

(i) the trend is linear or approximately linear

(ii) oscillatory movements affecting the data are regular in period and amplitude

(iii) Both (i) and (ii) are correct

(iv) None of the above

(c) An obvious drawback of 'ratio to moving average' method is that

(i) loss of trend values in every alternate month or quarter

(ii) loss of trend values in the beginning of the data

(iii) loss of trend values at the end of the data

(iv) loss of trend values in the beginning and at the end of the data

(d) The methods of eliminating cyclical movements are

(i) direct analysis

(ii) harmonic analysis

(iii) reference cycle analysis

(iv) All of the above

(e) If only linear trend is present in the time series data, then the best procedure for smoothing discrete time series is

(i) simple exponential smoothing

(ii) Holt's trend method

(iii) Holt-Winters trend and seasonality method

(iv) None of the above

2. Answer the following questions in brief : 2×5=10

(a) Mention the different types of mathematical curves used in fitting trends to economic and business time series data.

(b) Why is the multiplicative model the most commonly used assumption, as compared to additive model, in time series analysis?

(c) When would you recommend the 'ratio to trend method' for measurement of seasonal fluctuation in a time series?

(d) What do you mean by deseasonalization of data?

(e) What do you mean by weak stationarity and strict stationarity of a time series process?

3. *(a)* What is a time series? What are different components of a time series? Discuss them with suitable examples. 2+2+5=9

Or

(b) Define secular trend in a time series. Give some illustrations of increasing as well as decreasing trends in a time series. What are the methods of estimation of trend in a time series? How would you get trend values from an observed time series? 3+3+3=9

4. *(a)* Why are moving averages calculated in analyzing a time series? How is the period of a moving average determined?

A study of demand (d_i) for the past 12 years ($t = 1, 2, ..., 12$) has indicated the following :

$$d_i = \begin{cases} 100; t = 1, 2, 3, 4, 5 \\ 20; t = 6 \\ 100; t = 7, 8, 9, 10, 11, 12 \end{cases}$$

Compute a 5-year moving average. 3+2+6=11

Or

(b) What is meant by seasonal variation in a time series? Illustrate your answer with suitable example. Mention the objectives behind the analysis of seasonal variation in a time series. Describe the method of simple averages for determination of seasonal variation in a time series mentioning its merits and demerits. 2+1+2+4+2=11

5. *(a)* Explain the method of Link Relatives for measuring seasonal variations. Mention the merits and demerits of the method. 6+4=10

Or

(b) *(i)* Find the mean and variance of MA (2) Model. 5

(ii) Find the mean and variance of AR (2) Model. 5

6. *(a)* Write an explanatory note on Box-Jenkins methodology. 5

Or

(b) Explain the Triple exponential smoothing methods of forecasting by Holt-Winters trend and seasonality method using both additive and multiplicative models. 5

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