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6 SEM TDC DSE STS (CBCS) 4 (H)

2025

(May)

STATISTICS

(Discipline Specific Elective)

(For Honours)

Paper : DSE–4

(Time Series Analysis)

Full Marks : 55

Pass Marks : 22

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the following alternatives : 1×6=6

(a) The component of a time series attached to long-term variations is termed as

(i) cyclic variation

(ii) secular trend

(iii) irregular variation

(iv) All of the above

(b) Linear trend of a time series indicates toward

(i) constant rate of change

(ii) constant rate of growth

(iii) change in geometric progression

(iv) All of the above

(c) Moving average method of ascertaining trend is not suitable for

(i) finding trend values

(ii) projections

(iii) Both (i) and (ii)

(iv) Neither (i) nor (ii)

(d). Link relatives in a time series remove the influence of

(i) the trend

(ii) cyclic variation

(iii) irregular variation

(iv) All of the above

(e) Harmonic analysis method is based on the function y_t expressed in the form of

(i) Taylor's function

(ii) harmonic series

(iii) Fourier series

(iv) None of the above

(f) In exponential smoothing method of forecasting

(i) more recent values of the series are allowed to forecast the future values than more distant observations

(ii) more recent values of the series are avoided to forecast the future values

(iii) both recent as well as distant observations of a series are equally important to forecast future values

(iv) All of the above

2. Answer the following questions in brief : 2×6=12

(a) What purpose is served by time series analysis?

(b) What is the difference between deterministic and stochastic trends?

(c) Write the demerits of ratio-to-trend method of measuring seasonal variation.

(d) What are the methods of measuring cyclical variations?

(e) Write the merits of ratio-to-moving average method in measuring seasonal variation.

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

3. (a) What is a time series? Describe the nature of the components of a time series. How would you get trend values from an observed time series? 2+3+3=8

Or

(b) Explain the additive and multiplicative models of a time series. Describe any one method of fitting trend by

(i) modified exponential curve;

(ii) logistic curve. 4+4=8

4. (a) Why are moving averages calculated in analyzing a time series? How is the period of moving average determined? A study of demand (d_i) for the past 12 years ($t = 1, 2, \ldots, 12$) 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 fluctuations of a time series? Illustrate your answer with suitable example. Mention the objectives behind the analysis of seasonal variation in a time series. Explain the ratio-to-trend method to measure seasonal component of a series. 2+2+2+5=11

5. *(a)* Explain the method of link relatives for measuring seasonal variations. How do you identify cycles in a time series by harmonic analysis? 6+3=9

Or

(b) *(i)* Write a short note on autocorrelation function and correlogram. 2+2=4

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

6. *(a)* Explain each step of Box-Jenkins method. 9

Or

(b) Explain about the double-exponential smoothing or Holt's forecasting method. 9

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