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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

(2)

- (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

(3)

- (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 :

$2 \times 6 = 12$

- (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.

(4)

(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_t) for the past 12 years ($t=1, 2, \dots, 12$) has indicated the following :

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

Compute a 5-year moving average.

$$3+2+6=11$$

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(Continued)

(5)

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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