3 (Sem–5/CBCS) STA HE 2

2024

STATISTICS

(Honours Elective)

Paper : STA–HE–5026

(Time Series Analysis)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions as directed :

$1 \times 7 = 7$

(a) Most frequently used mathematical model of a time series is

(i) additive model

(ii) multiplicative model

(iii) mixed model

(iv) All of the above

(Choose the correct option)

(b) The method which determines secular trend with the help of two points only is known as ____ method. *(Fill in the blank)*

(c) Periodic changes in a time series related to business activities are called ____. *(Fill in the blank)*

(d) Residual method is used for determining

    (i) trend component

    (ii) seasonal component

    (iii) cyclical component

    (iv) random component

    (Choose the correct option)

(e) Deseasonalisation data means eliminating ____ from the series. *(Fill in the blank)*

(f) Simple average method is used to calculate trend component. *(State true or False)*

(g) If the trend line with 1975 as origin is $Y = 20.6 + 1.68X$, the trend line with 1971 as origin is :

    (i) $Y = 20.6 + 6.72X$

    (ii) $Y = 13.88 + 1.68X$

    (iii) $Y = 34.61 + 1.68X$

    (iv) None of the above

    (Choose the correct option)

2. Answer the following questions :   2×4=8

(a) What are the main problems in the analysis of time series ?

(b) Which component of the time series is mainly applicable in the following cases ?

    (i) A lock-out in a factory for a month

(ii) The sales of a departmental store on Dushera and Diwali.

(iii) Price of gold over a long period.

(iv) Prosperity

(c) State *one* merit and *one* demerit of ratio to moving average method.

(d) Explain irregular movements in a time series.

3. Answer *any three* from the following questions : 5×3=15

(a) Explain the uses of time series analysis.

(b) Describe the mathematical models for a time series analysis.

(c) How can you convert annual trend equation $Y = a + bX$ to

(i) monthly-trend equation ?

(ii) quarterly-trend equation ?

(d) Explain simple average method. Also discuss its merits and demerits.

(e) While measuring trend by the method of curve fitting using least square method, what are various types of curves that may be used to describe the given data ?

[Give mathematical expression for the curves with names]

4. Answer *any three* from the following questions : 10×3=30

(a) Define a time series. Describe various components of a time series with examples. 2+8=10

(b) Describe the method of link relatives for finding seasonal indices. Also write the merits and demerits of this method. 5+5=10

(c) Describe the method of moving averages for estimating the trend in a time series. Also discuss its merits and demerits.

5+5=10

(d) (i) Explain semi-average method with its merits and demerits. 6

(ii) What do you mean by deseasonalisation of data ? Explain in brief the procedure of finding the deseasonalised values from a time series. 4

(e) Describe ratio to trend method and ratio to moving average method of determining seasonal fluctuations.

5+5=10

(f) What is exponential smoothing? How does the method of exponential smoothing help in business forecasting ?

4+6=10

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