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3 (Sem-5/CBCS) STA HE 2

2021

(Held in 2022)

## 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 as directed :

1×7=7

(a) The oscillatory movement of the time series, having the period of oscillation more than a year is termed as *Cyclical fluctuations*  
(Fill in the blank)

Contd.



(f) The method of least squares used to fit the trend of a time series is applicable only when the trend is

(i) linear

(ii) parabolic

✓(iii) Both (i) and (ii)

(iv) Neither (i) nor (ii)

(Choose the correct option)

(g) Simple average method is used to calculate ~~Seasonal~~ indices.

(Fill in the blank)

2. Answer the following questions in brief :

2×4=8

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

(i) Increase in money circulation ~~trend~~

(ii) An increase in employment of labour during harvest time ~~seasonal~~

(iii) Recession ~~cyclical~~

✓(iv) The expenditure of political parties in the days of election ~~cyclical~~

(b) Define time series and give its two examples.

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

(d) Explain in brief the uses of time series analysis.

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

(a) Explain in brief various components of a time series with suitable illustrations.

(b) Mention different types of mathematical curves used in fitting trends to economic time series. Also indicate the procedure for fitting an exponential trend to time series.

(c) How can the annual trend equation  $Y = a + bt$  be converted to

(i) monthly trend equation?

(ii) quarterly trend equation?

(iii) half-yearly trend equation?

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(i)  $Y = \frac{a}{12} + \frac{b}{12 \times 12} t$

(ii)  $Y = \frac{a}{12} + b \frac{t}{12 \times 12}$

(iii)  $Y = \frac{a}{2} + \frac{b}{24} t$

(d) How to find out the trend by the

(i) graphic method ;

(ii) semi-average method ?

Also write the merits and demerits of semi-average method.

(e) How can the ratio to moving average method be applied for computing the seasonal indices ?

Answer the following questions :

10×3=30

4. (a) Describe the method of moving averages for estimating the trend in a time series. Discuss its merits and demerits. Also mention the uses of trend analysis.

10

Or

Show how the moving average method of determining the trend of a time series is related to the method of fitting curves by the principle of least squares. 10

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5. (a) (i) Describe the method of link relatives for finding seasonal indices. 6

G.K.P. 2.51

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

Or

(b) Describe briefly a method for the study of the random component of a time series, bringing out clearly the assumptions under which it is applicable. Also estimate the variance of the random component of a time series. 10

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6. (a) Describe different methods for measuring cyclical variation in a time series. 10

**Or**

(b) Write short notes on the following :

5+5=10

(i) Correlogram

(ii) Exponential smoothing

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