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3 (Sem-5/CBCS) STA HE 2

2023

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 : $1 \times 7 = 7$

(a) Time series enables us to study the past behaviour of the phenomenon under consideration. (State True or False)

(b) Least square method can be used to fit modified exponential curve, Gompertz curve and logistic curve.

(State True or False)

(c) Moving average method can be used for forecasting or predicting future trend. (State True or False)



Contd.

(d) The consistent increase in production of cereals constitutes the component of a time series :

- (i) Secular trend
- (ii) Seasonal variation
- (iii) Cyclical variation
- (iv) All of the above

(Choose the correct option)

(e) Given the trend equation $\hat{Y} = 108 + 2.88X$ with 1980 as origin and yearly data from 1980 to 1992, the estimated value for 1985 is _____.

(Fill in the blank)

(f) A time series is a set of values arranged in _____ order. (Fill in the blank)

(g) If the annual trend equation with 1984 as origin is $\hat{Y} = 112.8 + 6.48X$, the monthly trend equation is _____.

(Fill in the blank)

2. Answer the following questions : $2 \times 4 = 8$

- (a) State *one* merit and *one* demerit of the graphical method of determining trend.
- (b) Which component of the time series is mainly applicable in the following cases ?
 - (i) A strike in steel industry delaying production for 10 days.
 - (ii) Quarterly fluctuations observed in a time series.
 - (iii) An increase in employment during harvest time.

(iv) A need for increased wheat production due to constant increase in population.

(c) Define time series with examples.

(d) Explain semi average method of determining trend.

3. Answer **any three** of the following questions : $5 \times 3 = 15$

(a) Explain the models commonly used for decomposition of a time series.

(b) Describe various components of a time series.

(c) Explain simple average method of determining seasonal variation. Also discuss its merits and demerits.

(d) Discuss the uses of time series.

(e) Give the equation of an exponential curve and method for its fitting.

4. Answer **either (a) or (b)** from the following questions :

(a) What is meant by trend of a time series ? Describe the method of moving averages for estimating the trend in a time series. Discuss its merits and demerits. $2 + 6 + 2 = 10$



(b) What do you understand by seasonal variation? Describe the method of ratio to trend method with merits and demerits. $2+6+2=10$

5. Answer **either (a) or (b)** :

(a) Describe the method of link relatives for finding seasonal indices. Also mention the merits and demerits of this method. $6+2+2=10$

(b) Define random component of a time series. Describe variate difference method. $2+8=10$

6. Answer **either (a) or (b)** :

(a) Discuss the method of least squares for determining trend in a time series. Also discuss the merits and demerits of this method. $6+2+2=10$

(b) Write short notes on : **(any two)**
 $5 \times 2 = 10$

(i) Deseasonalisation of data

(ii) Growth curves

(iii) Exponential smoothing

