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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 ____.
- (f) A time series is a set of values arranged in ____ order.
- (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