2023

B.A./B.Sc.

Fifth Semester

DISCIPLINE SPECIFIC ELECTIVE – 2

STATISTICS

Course Code: STD 5.21

(Time Series Analysis)

Total Mark: 70 *Pass Mark: 28*

Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. (a) Which of the following components of times series cannot be eliminated? 1

   (i) Regular (ii) Random

   (iii) Cyclical (iv) Seasonal

   (b) What is meant by time series? Discuss the importance of time series in business and economics. 2+5=7

   (c) Explain the method of least squares of measuring secular trend. 6

2. (a) Secular trend can be measured by 1

   (i) two methods (ii) three methods

   (iii) four methods (iv) five methods

   (b) What are the components of a time series? Explain briefly each of them. 1+6=7

   (c) Explain the method of three selected points of fitting modified exponential curve. 6

UNIT –II

3. (a) Ration to moving average method is used for determining 1

   (i) Seasonal variation (ii) Trend

   (ii) Cyclical variation (iv) Irregular variation

   (b) Describe the method of moving averages of measuring secular trend in time series. Discuss its merits and demerits. 2+4=6

(c) Explain the method of simple averages of measuring seasonal variation and mention the merits and demerits of this method. 4

(d) Calculate the 3 years moving average of the five values 17.2, 15.4, 24, 18.5, 33.2. 3

4. (a) The decline in birth rate is attached to the component of the time series: 1

(i) Secular trend (ii) Cyclical variation

(ii) Seasonal variation (iv) Irregular variation

(b) Write down the fitting of a Gompertz curve. Describe briefly the detrending of data. 4+2=6

(c) Describe the steps to be followed in the measurement of seasonal variation by the method of ratio to trend method. 4

(d) Why is the multiplicative model the most commonly used assumptions, as compared to additive model, in time series analysis? 3

UNIT–III

5. (a) The term prosperity, recession, depression and recovery are in particular attached to 1

(i) secular trend (ii) seasonal variation

(iii) cyclical variation (iv) irregular variation

(b) Write down the harmonic analysis of determining the cyclic component of a time series. 5

(c) Define multicollinearity. Prove that if the intercorrelation between the explanatory variables is perfect $\left(Y_{x_i y_j} = 1\right)$, then the estimates of the coefficient are indeterminate. 2+5=7

(d) The standard error of the estimates became infinitely _____. (large/small). 1

6. (a) Harmonic analysis method is based on the function expressed in the form of 1

(i) Taylor's function (ii) Fourier Series

(iii) harmonic series (iv) autoregressive series

(b) Explain the measurement of cyclic variation. 4

(c) Describe the link relative method of measuring seasonal variation. 6
(d) Explain the two sources of multicollinearity. 3

UNIT–IV

7. (a) Define the following: 2×3=6
   (i) Autocorrelation
   (ii) Correlogram
   (iii) Auto covariance function
   (b) Explain what do you mean by the term strictly stationary. 4
   (c) Explain a purely random process. 4

8. (a) Define moving average process. 2
   (b) Obtain the parameters of the process along with the auto covariance and auto correlation function. 6
   (c) Define the first order auto regressive process. Illustrate the process using a correlogram. 2+4=6

UNIT–V

9. (a) Which of the following component of the time series cannot be eliminated? 1
   (i) Secular trend (ii) Seasonal variation
   (iii) Cyclical variation (iv) Irregular variation
   (b) Explain the irregular variation in time series. 5
   (c) Describe different types of exponential smoothing method. 8

10. (a) Exponential smoothing is a time series forecasting method for _____ data. 1
   (b) What is Box-Jenkin's method? Mention the advantages of Box-Jenkin's method. 2+4=6
   (c) Describe the Bayesian forecasting method. 7