Time series :It is a finite sequence of numbers represented in chronological correspondence.

Eg.Time (in years) (x): 2010 2011 2012 2013 2014 2015 2016

Export ( ‘000rs.) (y): 250 240 280 285 270 290 250

* X is an independent variable – time.
* Y is the actual export amount for that year. Y is mutually independent within and **of the time x also**. i.e., Y is mutually independent, and Y is independent of X.

// the Y values are not pure numbers, they are mixture of T,S,C,I variations. From Y, wehave to find these variations.

time series is a sequence of numbers which are in correspondance to equal interval of time.

each value of time -> equal interval.

time series values are not dependent on time, it is in correspondance to time.

there are many factors which individually or collectively affect the given variable and what we finally observe is a **joint effect**. There are many important factors which jointly, fully or partly impress the variable in problem. We study those factors and effects.

Importance-> to know the pattern.trend in which the data flows/appears.

forforcasting

1. To study the nature of variable in accordance with time.
2. To identify and segregate the different components in the given data.
3. To make forecast.

We know that the main purpose of study of the time series is to identify all the different components which to some or more extent are responsible to generate the numerical data which are in accordance with time and also the important feature is to make, so far as possible, forecast which finally helps understand the natural trend/ flow of the data

Components:

1. Long term components

* Secular Trend/Trend->
  + Basic tendency inherent in the variable
  + Steady Movement of data over long period of time, shows general direction.
  + Those values we obtain after removal of other variations.
  + Inherent in the given chronological data are the driving forces which build up the sequence; they do mix-up with the other forces giving rise to the time series data. ( Actual set of observations)
  + Price of gold, population, and national income..Etc; observations in this directions are the real facts but they ae the resultant of all the four factors– Long term and short term.
  + Study is important as it can (1) Identify general propensity (2) Help explain the major factors comprising the time series. (3) Forecasting over a reasonable period of time using different models (4) Extrapolation
* Cyclical Component ->Cyclical variations are the forces which exhibit their effects on data items/ actual price/ rate **over a period of time greater** than one year. It may be a cycle of more than one year but generally less than or equal to four years.
  + You cannot predict when and why they happen.
  + These changes are very slowly dependent of political situation of some major countries, steady climatic changes, impacts of modernization, and implementation of scientific researches and development in the society.
  + This cyclical changes are not at a regular interval. They do appear but between two occurrences the time slot is not constant.

1. Short term components

* Seasonal Component ->These variation are, as name suggests, seasonal. They are to appear with a span of one year. Also its impact on the given data is only for a particular span of the given year.

Eg price of gold, other items increase during festive season, and then drop during end and obtain a steady state

Both C and S are temporary changes but in some cases they attain a new height or fall which remain slowly attaining its trend.

* Erratic / irregular ->Such changes are the not well defined in advance. The time and intensity of their occurrence are never pre- known
  + Unpredicatble risks, not planned before, rare.
  + Situations like devastating flood, earth-quake, cyclone, and war between two or more countries etc. are the major causes and these are the forces which are responsible for extreme recession or hike in price of any commodities under study.
  + Once these forces are reflected in the data, it can be understood very distinctly. It is very important to understand to identify all such variations from the given graph.

All these may or may not be present fully or partially. Combined effect of all these factors is the given set of time correspondent values of some variable; which we call time series.

Time Series Models:

We have, on broad classification, three types of models to express a given situation more accurately.

1. Additive Model: In this case the actual observation has been expressed as y = T + S + C + I. We understand that S, C, and I are absolute deviations about the trend. All these components are independent.
2. Multiplicative Model: In this case the actual data is expressed as the product of these factors. Y = T. S.C. I where S, C, and I are relative variations.( rate, %, Index numbers) 625 = 600 x 1.05x 0.99 x 1.002

Also, log y = log ( TxCx S x I )

1. Mixed model are according to the flow of data.Y = T + S + C x I