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TIME SERIES

IIBF ABM

TIME SERIES

- **It is used to compare the present trend with the past trend that has already happened so the future trend can be estimated and prepared**.
- The cycle variations over a period using time series will allow us to understand the business cycle quite effectively.
- When we use statistical technique to measure time base data that is called as time series analysis.
- It has 2 variables.
- Helps to review current achievements, study past behaviour, compare them, predict future behaviour, forecast the trade cycle

There are 4 types of variations

1. Secular trend
2. Cyclical fluctuations
3. Seasonal variation
4. Irregular variation

Secular Trend: Changes come over a long period of time. Like a steady increase in cost of living recorded by CPI

Cyclical Variation: There are fluctuations of ups and downs, amplitudes of the peaks may vary. No regular patterns are there and are irregular

Seasonal Variations: Pattern change within a year. Also irregular in amplitudes. This is repetitive and predictable.

- **Past pattern can be established**
- **Then we can predict future**
- **Once established these variations can be removed from the time series called deseasonalization**

Irregular Variations: Based upon the number of variables which are unpredictable. The outputs may vary and so as the predictions in time series

Why trend analysis is important?

1. It enables us to **describe historical patterns** which will help us to evaluate the success of previous policies
2. Past trends will help us to **project the future**
3. We will be able to **separate the trend component** and eliminate it from the series

Trends can be linear and curvilinear.

CODING

- Suppose our time series consists of 2000, 2001, 2002, 2003 and 2004.
- If we have to use them in equations and find squares, the calculation becomes tedious. So, we use coding.
- The mean is 2002. The corresponding coded values are -2, -1, 0, +1, and +2.
- When the time series is an odd number of data, there is no problem as you get whole numbers and the mean = 0.

QUESTION AND ANSWER

Q1.

Year	2000	2001	2002	2003	2004
Number	12	16	18	15	19

Time is an independent variable.

Ans: 2002

Q2.A time series data for 9 years for the sale of tables by a furniture mart is given below from year 1993-2001, sequentially.

175, 190, 185, 195, 180, 200, 185, 190, 205.

(a) Find the linear equation that describes the trend of sales.

(b) Give a forecast for the year 2003.

Ans: 394.03

Using Second Degree Trends in Time Series:

When time series can be best described by curves. In these cases, the linear model does not adequately describe the change in the variable as time changes. To overcome this, we use parabolic curves.

Q3. The data for number of solar homes built in the region during the last 7 months is given (variable X is month) sequentially.

Number of homes: 16, 17, 25, 28, 32, 43, 50

Develop a second-degree equation for this data, that best describes this data.

Ans: Value of c = 0.511 and a =28.09

Q4. Most common example of a cyclical fluctuation is a _____?

Ans: business cycle

Q5. Under _____ type of variation, the change comes over a long period of time.

Ans: Secular Trend

CYCLICAL VARIATION

Cyclical variation is a component of the time series, which tends to oscillate above and below the secular trend line for periods longer than a year.

Residual Method

Q6. From the following data:

- **Calculate the percent of trend**
- **Relative cyclical residual for this data**

Year	1996	1997	1998	1999	2000
Y	75	78	82	82	84

X year	Y	Y^- estimated	Percent of trend	Relative cyclical residual
1996 1997 1998 1999 2000	75 78 82 82 84			

Use of Seasonal Index

- Seasonal indices are used to find out the seasonal variation.
- Then we remove the seasonal variations, to get the residual cyclical and irregular variations.
- We deseasonalize the time series, by dividing each of the actual value in the series by the appropriate seasonal.

Q7. Calculate Seasonal Index for each quarter.

Year	Q1	Q2	Q3	Q4
1998	87	106	86	125
1999	85	110	83	127
2000	84	105	87	128
2001	88	104	88	124