TIME SERIES ANALYSIS

MEASUREMENT OF TREND:

The trend is a concept of defining long-term. It does not include short-run oscillations but indicates the steady movements of the variable over a long period of time. But when we record a time series data on a variable, it includes short-run oscillations also. Thus, for measuring the trend values, we first smoothen the data to remove short-run oscillations. For such smoothing any of the following methods may be used:

1) Freehand Curve Method

First we draw a curve after plotting the data of a given time series. It will be irregular as it would include short- run oscillations. We may observe he up and down movement of the curve and smooth out the irregularities by drawing a freehand curve or line along with the curve previously drawn. This freehand curve would eliminate the short-run oscillations and show the long-period general tendency of the data. This is exactly what is meant by trend.

Note that this method has a serious disadvantage that different persons may draw the freehand line at different positions and with different slopes. There is, therefore, the danger of different conclusions being drawn by different persons.

Ex.1 The following are the figures of sale for the last nine years. Determine the trend line by the free hand method.

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Sale(lac unit)	65	95	115	63	120	100	150	135	172

Ex.2 Show the trend free hand.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Productions	165	178	236	213	180	185	194	170	189	195

Ex. 3 Show the trend using Free Hand Method.

Year	1991	1992	1993	1994	1995	1996	1997
Profit	60	72	75	65	80	85	95

2) Semi – Averages Method

Under this method the whole series is divided into two equal halves and the average for each half are calculated. If the data is for even number of years, We leave the middle year of the time series and two halves constitute the periods on each side of the middle year.

The average for a half is taken to be representative of the value corresponding to the mid-point of the time interval of that half. We, thus get two points. These two points are plotted on a graph and are joined straight line which provides us the required trend line.

Ex.1 Fit a trend line to the following data by the method of semi-averages:

Year	1990	1991	1992	1993	1994	1995	1996
Sales of Firm	102	105	114	110	108	116	112

Ex.2 Apply the method of semi-averages for determining the trend to the following data and estimate the value for the year 1990:

Year	1983	1984	1985	1986	1987	1988
Sale (thousand)	20	24	22	30	28	32

3) Method of Moving Averages

A moving average is an average of fixed number of items in a series which moves through the series by dropping the top item of the previous averaged group and adding the next item below in each successive average.

Thus a moving average is computed by adding all the values for a certain number of successive periods and then dividing the sum thus obtained by the number of periods and then dividing the sum thus obtained by the number of periods included. This average is considered as the trend value for the unit of time falling at the center of the period used in the calculation of the average. To compute three yearly moving average, for instance, the value of 1^{st} , 2^{nd} and 3^{rd} years are added up, averaged and the quotient is placed against the 2^{nd} year, then values of the 2^{nd} , 3^{rd} and 4^{th} years are added up, averaged and the average is placed against the 3^{rd} year, and so on

Moving averages may be calculated for odd number of years like 3 years moving average, 5 years moving average, 7 years moving average, and for even number of years like 4 years moving average, 6 years moving average and so on.

Ex. 1) Production of rice in a district during the lasts 10 years is given below-

Year	Production
1989	11200
1990	12300
1991	10600
1992	13400
1993	13800
1994	14500
1995	11600
1996	14300
1997	13600
1998	15400

Using three yearly moving average indicate the trend in the production of rice in the district.

Ex. 2) Following is the data set of new car registrations in town A.

Year	No. Of Registration
1982	786
1983	1011
1984	1193
1985	1125
1986	1068
1987	1119
1988	1120
1989	990
1990	1099
1991	1304
1992	1676
1993	1658
1994	1247
1995	1180
1996	1271
1997	1288

By using 5 yearly moving average, find the trend for the above data.

Ex. 3) Work out the 'centered 4 yearly moving average' for the following data:

Year	Tonnage of cargo cleared
1987	1102
1988	1250
1989	1180
1990	1340
1991	1212
1992	1317
1993	1452
1994	1549
1995	1586
1996	1476
1997	1624
1998	1586