2) Ratio to Trend Method:

This method is based on the assumption that seasonal variation for any given month is constant factor of the trend. It consists of the following steps.

(i) Compute the trend values by the principle of least squares by fitting an appropriate mathematical curve (st. line), 2nd degree parabolic curve or exponential curve etc)

(ii) Express the original data as the percentage of the trend values. Assuming the multiplicative model, these percentage will, therefore contain the seasonal, cyclic and irregular components.

(iii) The cyclic and irregular components are then wiped out by averaging the percentage for diff. months (quarters) if the data are monthly (quarterly), thus leaving us with indices of seasonal variation. Either mean or median can be used for averaging, but median is preferred to arithmetic mean.

(iv) Finally, these indices, obtained by step (iii), are adjusted to a total of 1200 for monthly data or 400 for quarterly data by multiplying them throughout by a constant k given by

$$k = \frac{1200}{\text{Total of the indices}} \quad \text{and} \quad k = \frac{400}{\text{Total of indices}}$$

for monthly and quarterly data respectively.

Merits and Demerits:

This method attempts at ironing out the cyclical or irregular components by the process of averaging, the purpose will be accomplished only if the cyclical variations are known to be absent or they are not so pronounced even if present. If the series exhibits pronounced cyclic swings, the trend values obtained by LS method can never follow the actual data as closely as 12-month mov. avg and as such the seasonal indices obtained by 'ratio to trend' are liable to be more biased than those obtained by 'ratio to mov. ~~avg~~ avg' method.

The advantage of this method over the mov. avg. method lies in the fact that 'ratio to trend' can be obtained for each month for which the data are available and as such, unlike to 'ratio to mov. avg' method, there is no loss of data.

Ex: Using ratio to trend method, determine the quarterly seasonal indices for the foll. data.

Year	I Qu	II Qu	III Qu	IV Qu
1995	30	40	36	34
96	34	52	50	44
97	40	58	54	48
98	54	76	68	62
99	80	92	86	82

Sol: First of all, we will determine the trend values for the quarterly averages by fitting a linear trend by the method of least squares.

Let the st. line trend be

$$y = a + bx \rightarrow (1)$$

and the normal eqns are

$$\sum y = na + b\sum x, \quad \sum xy = a\sum x + b\sum x^2 \Rightarrow a = 56, \; b = 10.$$

Hence, the st. line trend is given by the eqn

$$y = 56 + 12x$$

Putting $x = -2, -1, 0, 1, 2$, we obtain the avg. quarterly trend values for the years 1995 to 99 respectively.

From ①, we observe that

Yearly Increment in trend values $= b = 12 \Rightarrow$ Quar. Incr $= \frac{12}{4} = 3$

The +ve value of b implies that we have an increasing trend.

Next, we determine the quar. trend values as follows.

For the year 1995, the avg. quarterly trend value is 32 ~~and~~ which is, in fact, the trend value for the middle quarter i.e., half of the 2nd quarter and half of the 3rd quarter, of 1995. Since the quarterly increments is 3, we obtain the trend value of 2nd & 3rd quarters of the year 1995 as 32 − 1.5 and 32 + 1.5 i.e., 30.5 and 33.5 respectively and consequently the trend value for the 1st quarter is 30.5 − 3 = 27.5 & 4th quarter is 33.5 + 3 = 36.5