

17. What are the uses of Time Series ? (Important)

Solution : The uses of time series are :

- (i) The most important use of studying time series is that it helps us to predict the future behaviour of the variable based on past experience
- (ii) It is helpful for business planning as it helps in comparing the actual current performance with the expected one
- (iii) From time series, we get to study the past behaviour of the phenomenon or the variable under consideration
- (iv) We can compare the changes in the values of different variables at different times or places, etc.

18. Explain the measurement of trend by Moving Average Method. (Important)

Solution : It measures the trend by eliminating the changes or the variations by means of a moving average. The simplest of the mean used for the measurement of a trend is the arithmetic means (averages).

Let us consider, the moving average of a period (extent) m is a series of successive averages of m terms at a time. The data set used for calculating the average starts with first, second, third and etc. at a time and m data taken at a time.

In other words, it means that

the first average = the mean of the first m terms

the second average = the mean of the m terms starting from the second data up to $(m + 1)^{\text{th}}$ term

the third average = the mean of the m terms from the third to $(m + 2)^{\text{th}}$ term and so on.

If the extent or the period, m is odd i.e., m is of the form $(2k + 1)$, the moving average is placed against the mid-value of the time interval it covers, i.e., $t = k + 1$. On the other hand, if m is even i.e., $m = 2k$, it is placed between the two middle values of the time interval it covers, i.e., $t = k$ and $t = k + 1$.

When the period of the moving average is even, then we need to synchronize the moving average with the original time period. It is done by centering the moving averages i.e., by taking the average of the two successive moving averages.

19. What are the drawbacks (disadvantages) of Moving Average Method ?

(Important)

Solution : The drawbacks (disadvantages) of Moving Average Method are :

(i) The main problem is to determine the extent of the moving average which completely eliminates the oscillatory fluctuations.

(ii) This method assumes that the trend is linear but it is not always the case.

(iii) It does not provide the trend values for all the terms.

(iv) This method cannot be used for forecasting future trend which is the main objective of the time series analysis.

20. Explain the measurement of trend by Moving Average Method with its drawbacks. (It is also important)

Solution : Both the solutions of previous Q. Nos. 18 & 19.

21. A train running at $\frac{7}{11}$ of its own speed reached a place in 22 hours. How much time could be saved if the train would have run at its own speed ?

Solution : Let us consider, s is the actual speed of the train and d is the distance that needs to be covered to reach that place.

$$\text{Here, speed} = \frac{\text{Distance}}{\text{Time}}$$

As per question,

The train is running at $\frac{7}{11}$ of its own speed and reaches the place in 22 hrs.

$$\therefore d = \frac{7}{11} s \cdot 22$$

$$\Rightarrow d = 14s \dots\dots\dots(1)$$

Let us take, t is the time taken by the train to reach the place with its actual speed.

$$\therefore d = st \dots\dots\dots(2)$$

From (1) and (2), we get

$$14s = st$$

$$\Rightarrow t = 14 \text{ hours}$$

$$\therefore \text{Time that could be saved} = 22 - 14$$

$$= 8 \text{ hrs.}$$

22. The average production of a unit from the first six months was 3000 units. The total production in July, August and September was 13,500 units. What will be the average monthly production of the unit for the year if the average production for the last three months is 500 more than the average of the previous nine months?

Solution : Total production in first six months = $3000 \times 6 = 18000$

$$\text{Average of last nine months} = \frac{18000 + 13500}{9} = 3500$$

Now, average of last 3 months is 500 more than 3500

$$= 3500 + 500 = 4000$$

$$\text{Hence, Total Production in last 3 months} = 3 \times 4000 = 12000$$

$$\text{Therefore, total production} = 18000 + 13500 + 12000 = 43500$$

$$\text{and average monthly production for the year} = \frac{43500}{12} = 3625 \text{ units}$$

23. The average age of 100 nurses in a nursing home in 1982 was 50 years. In 1984 20 nurses retired from their job, whose average age was 60 years. In 1987, 40 nurse were employed whose average age was 38 years. The average age of all the nurse in 1990 was?

Solution :

Average of 100 Nurses age in 1982 = 50 years

Sum of 100 Nurses age = $50 \times 100 = 5000$

Sum of 100 Nurses age in 1984 = $5000 + 100 \times 2 = 5200$

In 1984, 20 Nurses retired whose average age was = 60 years

Sum of 20 Nurses age = $60 \times 20 = 1200$

Now, total Nurses in 1984 = 80

And their sum is = $5200 - 1200 = 4000$

Now, in 1987, 40 Nurses were employed whose average age = 38 years

Sum of their age is = $38 \times 40 = 1520$

In 1990, total number of Nurses are = $80 + 40 = 120$

And, sum of their age = $4000 + (80 \times 6 \text{ years}) + 1520 + (40 \times 3 \text{ years})$

$$= 4000 + 480 + 1520 + 120$$

$$= 6120$$

Average age in 1990 = $\frac{6120}{120} = 51 \text{ years}$

THE END

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