

1) Given the following yearwise sales data, forecast the sales for next year using the Semi Average Method.

| Year | Sales (in units) | Semi Total | Semi Average | Mid Point |
|------|------------------|------------|-----------------------|----------------|
| 2018 | 120 | 400 | $400 \div 3 = 133.33$ | (2019, 133.33) |
| 2019 | 130 | | | |
| 2020 | 150 | | | |
| 2021 | 170 | 550 | $550 \div 3 = 183.33$ | (2022, 183.33) |
| 2022 | 180 | | | |
| 2023 | 200 | | | |
| 2024 | ? | | | |

$$Y = mx + C$$

$$m = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{183.33 - 133.33}{2022 - 2019} = \frac{50}{3} = 16.67$$

$$m = 16.67$$

Find the intercept (C) using one point (say first half)

$$Y = mx + C$$

$$133.33 = 16.67 \times 2019 + C$$

$$C = 133.33 - 33656.73$$

$$C = -33523.4$$

Now calculate the sales in year 2024

$$Y = mx + C$$

P2

$$= 16.67 \times 2024 - 33523.4$$

$$= 33740.08 - 33523.4$$

$$= 216.68$$

Answer = 216.68

Q2 Given the yearwise sales data, forecast the series of next year using moving average method.

| Year | Sales | 3 Year Moving Average |
|------|-------|-----------------------|
| 2018 | 120 | |
| 2019 | 130 | 133.33 |
| 2020 | 150 | 150.00 |
| 2021 | 170 | 166.67 |
| 2022 | 180 | 183.33 |
| 2023 | 200 | |
| 2024 | ? | |

Now forecasting 2024, Sales, we use the next 3 year average. Use years 2022, 2023, 2024, But we have data till 2023, so to forecast 2024, we will use the trend of the moving average -

look at the increase in 3 year moving average
 from 133.33 to 150.00 $\rightarrow +16.67$
 from 150.00 to 166.67 $\rightarrow +16.67$
 from 166.67 to 183.33 $\rightarrow +16.66$

Pg. 3

Constant increase of $+16.67$ units/year

So forecast for 2024 $= 183.33 + 16.67 = 200.00$
 units

Question - Calculate the forecast for 4 year moving average -

| Year | Sales | 4 Year Moving average |
|------|-------|-----------------------|
| 2018 | 120 | |
| 2019 | 130 | 142.5 |
| 2020 | 150 | 157.5 |
| 2021 | 170 | 175.0 |
| 2022 | 180 | |
| 2023 | 200 | |
| 2024 | ? | |

$$Y_t = \mu + \theta_1^* \epsilon_{t-1}$$

$$\theta_1 = 0.6$$

To forecast sales of 2024, we will use the trend of the 4 year moving average

Let's look at the increase in 4 year moving average

\rightarrow from - 142.5 to 157.5 $\rightarrow +15.0$

from 157.5 to 175.0 $\rightarrow +17.5$

$$\text{Average increment} = \frac{15 + 17.5}{2} = 16.25$$

(18.4) ✓

Forecast for 2024

Assume trend continue -

$$= 175.0 + 16.25 = \underline{\underline{191.25 \text{ units}}}$$