Time- Series

Method of Least Square to fit Trend

1. Fit a trend line to the following data by the least squares method :

Year	1985	1987	1989	1991	1993
Production (in '000)	18	21	23	27	16

Estimate the production in 1995 and 1997.

2. The production data of a factory for the past 10 years are given :

Year	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Production (in tonnes)	75	86	98	90	96	108	124	140	150	165

Fit a straight line trend and tabulate the trend value. What is the expected production in 1987 on the basis of the trend?

3. Given below are the figures of production a sugar factory:

Year	1995	1996	1997	1998	1999	2000	2001
Production (in'000 tons)	40	45	46	42	47	49	46

Fit a straight line trend by method of least squares and estimate its value for 2004.

4. Fit a straight line trend of the following data using the method of least squares. From the straight line trend, estimate the demand for the year 1995.

Year (t)	1979	1980	1981	1982	1983	1984	1985
Demand for House Hold Heaters (in thousand)	600	825	970	1210	1440	1790	2070

5. Fit a straight line trend of the following data using the method of least squares. From the straight line trend, estimate the demand for the year 2005.

Year (y)	1998	1999	2000	2001	2002	2003	2004
Demand for (y) product in units (in thousand)	500	700	850	1100	1300	1600	1800

6. Fit a straight line showing the trend of the following data :

Year	2004	2005	2006	2007	2008
Production of Rice (in '000 tons)	28	39	46	40	56

7. Fit a straight line trend for the following data. Estimate the production for the year 2010.

Year	2002	2003	2004	2005	2006	2007	2008
Production (units)	125	128	133	135	140	141	143

8. Calculate the trend values by the method of least square from the data given below and estimate the sales for the year 1985.

year	1976	1977	1978	1979	1980
Sales of T.V. sales (in'000)	12	18	20	23	27

9. The following are the annual profits in thousand in a certain business :

Year	1971	1972	1973	1974	1975	1976	1977
Profit (thousands)	60	72	75	65	80	85	95

By the method of least squares fit a straight line. Using that estimate profit for 1981.

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10. Fit a straight line by the method of least squares for the data relating to the Indian population census given below .

Year	1901	1911	1921	1931	1941	1951	1961	1971
Population (milion)	238.3	252.0	251.2	278.9	318.5	361.0	439.1	547.9

11. From the data given below fit a straight line trend by the method of least squares :

Year	1975	1976	1977	1978	1979	1980	1981	1982
Sales(00,000 Rs.)	6.7	5.3	4.3	6.1	5.6	7.9	5.8	6.1

12. Below are given figures of production of a sugar factory :

Year	2001	2002	2003	2004	2005	2006	2007	2008
Production ('000 tons)	80	90	92	83	94	99	92	110

Find the trend to the above data by method of least squares.

13. Using 2005 as the origin, obtain a straight line trend equation by the method of least squares :

Year	2001	2003	2004	2005	2006	2007	2008
value	140	144	160	152	168	176	180

Find the trend value of the missing year 2002.

14. Fit a straight line trend method of the least squares to the following data :

Year	2003	2004	2005	2006	2007	2008
Production (Rs. In Crores)	7	10	12	14	17	24

15. Fit a straight line trend method of the least squares to the following indices.

Year	2002	2003	2004	2005	2006	2007	2008
Index No.	127	101	130	132	126	142	137

16. The following table show the number of salesman working a certain concern.

Year	2004	2005	2006	2007	2008
number	28	38	46	40	56

Use the method of Least Square o fit a straight line and estimate the number of salesman in 2009.

17. Fit a parabolic trend of the form $Y = a + bX + cX^2$ for the following data :

X	1	2	3	4	5
Y	19	27	29	33	29

18. Fit a parabolic trend of the form $Y = a + bX + cX^2$ for the following data :

Year	2004	2005	2006	2007	2008
Sales (in million Rs.)	10	12	13	10	8

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Method of Moving Average:

19. Calculate the 3-yearly moving averages of the data given below:

Years:	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
.Sales(millions of rupees)	3	4	8	6	7	11	9	10	14	12

20. Calculate the 3-yearly moving averages of the data given below:

Years:	1953	1954	1955	1956	1957	1958	1959	1960
Values	3	5	7	10	12	14	15	16

21. Calculate the 4-yearly moving averages of the data given below:

Years:	1991	1992	1993	1994	1995	1996	1997	1998
Annual Sales(Rs. In Crores)	36	43	43	34	44	54	34	24

22. The following table shows the average monthly production of coal in millions of tones for the year 1987-1996.

year	Average monthly production of coal (in million tones)	year	Average monthly production of coal (in million tones)
1987	50.0	1992	38.1
1988	36.5	1993	32.6
1989	43.0	1994	41.7
1990	44.5	1995	41.1
1991	8.9	1996	33.8

Determine 4-yearly moving average figures.

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