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B.COM. PART 1

CORE CONCEPT OF BUSINESS MATHMATICS & STATISTICS

3) Moving Average Method- It consists in obtaining a series of moving averages of successive overlapping groups or sections of the time series. From the point of view of calculation of moving averages, the question can be divided in two categories-
   a) When Period is Odd- 3, 5, 7, 9 year moving average method
   b) When Period is Even- 2, 4, 6 year moving average method

Example-16- Find out trend of the following data by 3year moving average method.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production	9	12	13	14	17	18	20	22	24

Solution-16:   **Trend value**

Year	Prod.	3 y total	3 Y Avg(Total/3)
2001	9	-	-
2002	12	9+12+13=34	11.33
2003	13	12+13+14=39	13
2004	14	13+14+17=44	14.67
2005	17	14+17+18=49	16.33
2006	18	17+18+20=55	18.33
2007	20	18+20+22=60	20
2008	22	20+22+24=66	22
2009	24	-	-

Example-17- Find out trend of the following data by 4year moving average method.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production	9	12	13	14	17	18	20	22	24

Solution-17:

Year	Prod.	4 y total	2periods total centered	Trend Values
2001	9			
2002	12			

Year				
		9+12+13+14=48		
2003	13		48+56=104	104/8=13
		12+13+14+17=56		
2004	14		56+62=118	118/8=14.75
		13+14+17+18=62		
2005	17		62+69=131	131/8=16.38
		14+17+18+20=69		
2006	18		69+77=146	18.25
		17+18+20+22=77		
2007	20		77+84=161	20.13
		18+20+22+24=84		
2008	22			
2009	24			

IV) Method of Least Squares- This method is called the method of least squares because the sum of squares of deviations of various points of trend line from original data would be the least as compared to the sums of squares of the deviations obtained by using any other line.

Fitting a straight line trend by least Square Method-

Equation is $Y_C = a + bX$

To Find the value of a and b we used following two equations-

$\Sigma Y = Na + b\Sigma X$

$\Sigma XY = a\Sigma X + b \Sigma X^2$

Example-18- Calculate trend value from the following data by least squares method-

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
Production(y)	9	12	13	14	17	18	20	22	24

Taking origin year as 2005. Estimate the production for the year 2016.

Solution-18:   Trend Value

Year	y	x(year-2005)	(x)2	xy(x*y)	[$Y_c = a + bx$]
2003	9	-2	4	-18	16.56
2004	12	-1	1	-12	18.36
2005	13	0	0	0	20.16
2006	14	1	1	14	21.96
2007	17	2	4	34	23.76
2008	18	3	9	54	25.56
2009	20	4	16	80	27.36

2010	22	5	25	110	29.16
2011	24	6	36	144	30.96
	149	**18**	**96**	**406**	

$\Sigma Y = Na + b\Sigma X$

$\Sigma XY = a\Sigma X + b \Sigma X^2$

$149 = 9a + 18b$ …..(1)

$406 = 18a + 96b$ …..(2)

Multiply equation (1) by 2 we get

$298 = 18a + 36b$

$406 = 18a + 96b$

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-108 = -60b   b = -108/60, b = -1.8

Put the value of b in eq. 1-

$149 = 9a + 18(-1.8)$

$149 = 9a - 32.4$

$149 + 32.4 = 9a$

$181.4/9 = a$ **a = 20.16**

$Y_c = 20.16 - 1.8x$

Value for 2016- 2015-2005 = 10 = x

Trend Value- 20.16 + 1.8*10

= 20.16 + 18

= 38.16