

# CHAPTER-7 ANALYSIS OF TIME SERIES

- A series formed from a set of Statistical data arranged in accordance with their time of occurance is said to be a time series.
- > A time series shows the relation between two variables, one being the time.
- -> Components of Time series: (Factors affecting-time series)
  - a. Secular Trend (size of population, volume of production)
- b. Seasonal Variation (cold drinks and Ice-cream highly demand in summer)
  - c. Cyclical Flu Ctuation (Recession, depression)
  - occurance such as war, strike, flood, earthquake, etc.)
- > Methods of Measuring Trends
  - 1. Graphical or Free Hand curve Method
  - 2. Semi-average Method
  - 3. Moving average Method
  - 4. Léast Equare Me-1400

Moshoiles. Coll

* Least square Method:	r Hugh	[1342]	Tig_
		. 10	8
the equation of straight line trend	is given	by:	
$Y_c = 9 + bX$	-0	O .	-
	1390-357	120/1	History.
To find the value of a and b.	we should	Solve	
the following two equations:	118 40 8-1	1,494	19 PC
20 H-12 - 129 mai > 71 W = 601 - 12 P	2 - Σ L		19.
EY = na + b = X - 0	1 1 24 7 2		#Y
£χγ= q £x +6 £x2 - 0		8 10 10	14000
	- "(0)	Ja	0/02
Since, $\leq \chi \geq 0$	rom eqn(ii)	0. +0	1.110
From eqn () 10 Exy=	0X0+ P5X	Te in Circ	Pare Li
5Y- 00+0XU	- () + b2X	Solve /	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
4y= na b=	£XY	Liberard Cons	1
69 = \$Y = 1346 21 030 TURS	ξX2	Mahire ar	5
<u>n</u> :://-	-= XV7-0:=	1	
where,		12000000	fair
Y= actual value of Y	(-11.0)	15/5 5100	D .
Ye= computed value of y (Trend )	lationey -	V = -1:	
a = Constant which is computed	When zy=	wwe board	20
b = constant which is the char	nge in 9 c	orrespond	1119
to the change in x by	one unit	100 - 4	
X = -lime in case of time sense	es analysis	1 /4 /4 / 2 / 2 / 4 / 4 / 4 / 4 / 4 / 4 /	
	. , 0	X.3.	1
the second of the part of the	r de jurid	and pride	1.1
		1	
Trisile, smile block 12 for whom self-	51 / 4 n.c.	1.2.91	1

	ōĪ,	Calculation	of str	aight lin	e trend	Footbox 50	t, and
4	- 4	markly		-1-0-1-1	1 701+1	short Term -	Fluctuation
Year	Profit	X= t-2009			Trend	Multiplicative	Additive
(t)	(Y)		XJ	XY	values (Yd)	= Y/Y X 100	= Y-Yc
2006	60	-3.	9	-180	61.08	98.23	-1.08
2007	72	-2	4	-144	66.15	108.84	-36-845.85
2008	75	-1	- 1	-75	71-22	105.31	-30-313-75
2009	65	0	0	. 0	76-29	85.20	-20-2-11-2
2010	80	1	1	80	81.36	98.33	-1.36
2011	85	2.50	4	140	86.43	98.34	-1.43
2012	97	3 3	9,×	291	91.5	106-0T	5.5
N=7	EY= 534	€X=0	$\xi \chi^2 = 28$	EXY= 14	12 07014	60-573	1534
					7.6.2		
2 11	21	111	EN.			MEYE .	
0. 31	he straig	ht line tre	The state of the s	uation is	s given by	7(7 ± 7 ± 5 ± 5 ± 5 ± 6 ± 6 ± 6 ± 6 ± 6 ± 6 ± 6	
0. 31	he straig	ht line tre Y=0+bX	The state of the s	uation is	s given by	17 = 72 = 2 24 = 65; 1	
		Y=0+bx	The state of the s	uation is	s given by	Σ (1 ± γ ≥ · Σ (2 ± γ ),	
	he straig here, £X:	-0 Y=0+px	-0'		Y /3 9/1	0 (7 ± y ≥ + + + + + + + + + + + + + + + + + +	
	here, £X:	=0 Y=0+bx	-0'	avrí s l	7 13 spil 3 surmi b	0 (7 ± y 25 25 1 ± y 3 y 3 6	9
Id	here, <u>&amp;</u> X:	Y=07bx =0 Y=534	-0'	k v. hve Combo	Y 13 SUP 3 Suppr b	0 (1 ± y ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ±	
Id	here, £X:	Y=07bx =0 Y=534 1 7	-0'	1 v. hve Comb	7 13 spil 3 surmi b	0 (1 = 1	
Id	here, £X:	Y=07bx =0 Y=534 1 7 7	一〇 <sup>1</sup>	avel y 4 velove) 15 1 <b>92</b>	Y 100 500 or Surmy b or 12 or 12 or 15 or 1	(	
Id	here, <u>&amp;</u> X: Q= <u>&amp;</u> b = <u>&amp;</u> X	Y=07bx =0 Y=534 Y=142	-0'	2000) 15 1 <b>92</b> 20 X	Y 13 SUP 3 Supports 2 Supports	5 (1 = 1	
la M	here, £X: Q= £ b= £X	Y = 0.4bx =0 $Y = 534$ $Y = 534$ $Y = 142$ $Y = 28$	-0'	29 20 20 X 00	A COUNTY OF	1	
la M	here, £X: Q= £ b= £X	Y=07bx =0 Y=534 Y=142	-0'	29 20 20 X 00	Y 100 500 or Surmy b or 12 or 12 or 15 or 1	1	

```
b. Calculation of Trend Yalues:
            Yc= 76.29+5.07X
 When,
                        Y_c = 76.29 + 5.07 \times (-3) = 61.08
  For 2006,
             X=-3
                        Ye = 76.29+ 5.07 x (-2) = 66.15
   For 2007.
              X=-2
                        Yc = 76.29 + 5.07x(-1) = 71.22
  For 2008.
              X = -1
  For 2009,
                         Yc = 76.29 +5.07 X 0 = 76.29
              X= 0
                        Yc = 76.29+5.07 x1 = 81.36
  For 2010,
             X = 1 .
                         Yc = 76.29+5.07 x2 = 86.43
  For 2011.
              X= 2
   For 2012
                         Yc = 76.29+507×3 = 91.5
             X= 3
d. Monthly Increase in profit =
                                      5.07
                                       12 = 0.4225 (000)
                                12
                                           = Rs. 422.5
   can of profit
                 for 2015
     X=t-2009 = 2015-2009 = 6
      Yc = 76.29+5.07X
         = 76.29 + 5.07 X6
         = RS. 106.71 (000)
                                   Progress ONLINE Tuition
                                    class Notes 9851214642
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2073 Q.	NO.16			X - F162 B	or tell wind	size 6
Solo	• • •					, - 1
_	can of s	traight line -	Irend: (0)	serjust of	305 mi =}	
	A most	1				
	Sales	Compared 193.	100 m do	(3)中国产品	1-2-6 =31	200
<u>(t)</u>	(Y)	X=t-2009	X2	XY		,
2006	148	-3	12.90 2	1-444	Filled s	Mario
2007	207	-2	4	-414	terit en la des	St. 5
2002	246	-1	1	-246	(4) 为。其"40年	FRON
2009	329	0	0	0		figer 11
2010	378	1	20.1m b	378	rimujeu .	120°
	476	2	4	952	4174	(相互)对
	517	31X	9	1551	BUG IN	
	Y= 2301	£X=0	£x2= 28	EXY=177	1	12 (12 GP)
- 4	8 30 2		C. C. Carlo	Et		1.00
a. Using	least s	quare Method	: A A		10	Tellis.
The st	raight	line trend e	quation	is given by	: 74	Paller
3.10	Υ=	9+62		0 0		当于156
K. T.	rry his	14 7	1.	- translation -		- D. sw!
Since,	5X=0	State CCA SS	10			S. T. Put
		a = 2Y - 230	1 8	· 14.14.679	(1)	- V = 1 14
1981 118	p. p	F 1904	= 328.	414 h	14-1201	· 0 - 40 -
	- State of	348.) 73.	2.7 - Sv <sub>10</sub>	3 - 1 0 2/23	1	1.7.0
		0 = 5XY -	1777			SOLUTE STATE
1,000	AV BAY	<b>ź</b> χ <sup>2</sup> .	28 = 6	31.46 AM. 3.	number factor	(MdV)
50,		to the second			4 1	4
V.	= 328.7	114 + 63.46X	is the h	equired tren	d line	1-415
10		uation.			0-10 M	5-
-			1000	Paralle San		

	V-1	2002 2011 201			or for the	
	X = T - :	2009 = 2014 - 200	19 = 5	district telespe	102 421 100	-
	Yc = 32	x 24.87	5 = 646	(noinion) pro-	1000	
		1.1	11	1003 -157	+ 10	1
C. Sin	ce. b= 6	13.4670 , it 19	s a Risi	ing trend.	20%	
	14	2,1-1-		0	v 12 Fric	
2077	Back	8. Ho.15		2-	gur.	1.
So	In .	0		or.	er er	. (
	Cal	culation of trend	values		CORE	- 0
Month	Profit	CO CO	1	2		-
(t).	(Y)	X=t-5	X2	XY	Trend values (	Ye)
Jan=1	60	-47	76	-240	60.02	7
Feb = 2	72	-3	9	-216	65.57	-53
March=3	75	-2	4	-150	71.12	33.
April=4	65	· Total Tell Til	0.410.0	- 65	76.67	13 %
May=5	80	0	0	1 0 Fu+	82.22	2
June = 6	85	1	1	85	87.77	
1414=7	95	2	4	190 .	93,32	AT.
Aug .= 8	103	3	9 .	309	98.87	2 15
\$61.=9	105	4 1	16	420	104.42	
N=9	£Y=740	0 \$x=0	£x2=60	EXY= 333		
- 1	- 1 304	A STATE	F.F.	1 2 1 1 2 1	4.	3
Using	least 9	quare Method:	FF . 25	. Y.	(9) 91	i
. 0			111			14
The	trend	line equation i	s given 1	py:	5 8 L	,
	Y- (	1+626	0.	0		×

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Since, EX=0
     9= EY
                0PF
                    = 82.22
      b = EXY
                  333
          ≤X2
                  60 = 5.55
                                                             24
    Yc = 82.22 + 5.55 X is the required equation.
  Can of brofit for December:
     December (+) = 12
               X = t-5 = 12-5 = 7
                Y_{c} = 82.22 + 5.55 \times 7 = 121.07 (000)
   Cain of frend values:
                       Y_c = 82.22 + 5.55 \times (-4) = 60.02
            X=-4
For 190:
            X = -3
                       Ye = 82.22 + 5.55 x (-3) = 65.57
for feb:
                        Yc = 82.22 +5.55x (-2) =71.12
            X=-2
For March:
For April:
             1- = X
                        Yc = 82.22 + 5.55x(-1) = 76.67
             X= 0
                        Yc = 82.22 + 5.55 x 0 = 82.22
For May:
for Jane:
                         Yc = 82.22 + 5.55×1 = 87.77
             X = 1
For July:
             X= 2
                         Yc = 82.22 + 5.55x2 = 93.32
             X= 3
                         Yc = 82.22 + 5.55×3 = 98.87
              X = 9
                          Yc = 82.22 + 5.55 x4 = 104.42
```

2069 Q	P.04.	(Zimbor post* 46 mattelpositi
Solp		
=	Calcula	tion of Trend values
Year	Sales (in 000)	
(4)	(Y)	x = 2(t - 2007.5) x2 xy Trend values (Yc)
2005	12	-5 25 -60 10
2006	13	2 -3 12.8
20074	14	- 142 - 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6- 15.6-
2008	15	36 1 X2 36 1 15 18 4 2
2009	22	3 9 66 21.2
2010	26	5 5 6 x 4 00 25 130 = / 24 4-
N=6	5Y= 102	$\leq x = 0$ $\leq x^2 = 70$ $\leq xy = 98$
	Company I	= 0+bx
9	ince EX=0	
		The second secon
11 13 7	9= 2Y_	102
	N	6 - 17
100	b = EXY	_ 98
	≤x2	70 = 1.4
	4 1 4	(9-1) 10-17 (10-12) PM; 97 (1)
		A LINE OF THE PROPERTY OF ALLER
00	Yc = 17+	IUX is the required equation.
000	Yc = 17+	14X is the resourced equation.

12.							A		
Car	culation of	Trend V	alues:	. 4	The state of		house in	201.04	
		= 17+1.0			- 14			- W	
7				21 100	trupo i fr	591 .	est Hybrid	14.5%	
For	2005	X = -5	. Yo	= 17	+ 1.4x(-	5) =	70		
For		X = -3			+ 1.4 × (-		12.8		
For	2007,	X= -1			+ 1.4 x (-			12	7.
For	2008,	X = 1	, Y	= 17	+ 1.4 X 1	=	18.4		
	2009,	x = 3		-	AI.UX3		21.2		1-1
For			-		+1.4×5		24		41 9
		100 mg				1.3			1
(	carn of sau	es for 20	12		- F7		dr. St.		
				2(20	12-2007	5) = 9	(3		
	-/\-								7
	Ye =	17+14X9	= 29	.6 (in	000)	11.2	5.11.7		
		11/12/2002			0 = Ks.5				
		1 10 10		dr. c	13	10 -01	: 15/02.1	g Htg	
	100000000000000000000000000000000000000								
206	5 Q. NO.6		· · · · · · · ·	11.11	0.5.0	X Y -	F) ; = ; =		
	5 Q·NO.6			7.	(8.5) · (8.5)	1 V - 1	H		
		00)			(8.8) (3.8)	P - 3     23	H		
	Sales in (a		2(1-9	2000.5)					
Years (t)	Solp Sales in (o (A)	X =	2( <del>\</del> -9	2000.5)	'.a + <b>x</b> 2		×Υ		
(t) Years	Solp Sales in (o (y) 40	<u>811</u> 00 <b>X≥</b> X11193-7		2000.5)			<u>×Y</u> -200		
Years (t) 1998	Solp Sales in (o (y) 40 52	<u>81</u> 0(0 <b>X≥</b> X11193-r	1-5	2000.5)	25		×Υ -200 -156		
(t) Years	Solp Sales in (o (y) 40	<u>81</u> 0(0 <b>X≥</b> X11193-r	-5 -3	2000.5)	25 9		<u>×Y</u> -200 -156 -54		
7000 1998 1998 76012	Solt Sales in (0 (y) 40 52 54	<u>81</u> 0(0 <b>X≥</b> X11193-r	-5 -3 -1	2000.5)	25 9 1		×Υ -200 -156 -54		
2000 7000 1998 1998 1998 Years	Solp Sales in (o (y) 40 52 54	<u>81</u> 0(0 <b>X≥</b> X11193-r	-5 -3 -1	2000.5)	25 9 1		<u>×Y</u> -200 -156 -54		

Ising least squam	e Method:	78	all the	Set of	to militi	1
0		Harry N. a.	171	1.4 7.10	Y	
The straight lin	ne trend equ	ation is a	wen t	冰:	TWE TO	
3	Yc = 9+ 6x	11111	7 17	0	H630	195
8:2	L EXECUTION	Dr. 1 1 2 3)		t = X	. 1,5500	777
Since, &X =	0 = ( = ) × 0			X	- F1006	HE
		1 + 5! = 31	1-1-1	A 1 5	360	, ,,,,,,
9: 5		301 - 1 = V		是 5 %	P. Print	
100	H SXI	6 = 50	.167	8 5 70		· Fall
			15.5		Siles of the	
b = 2	χΥ <u>57</u> χ² 70 =		- Lio	2 16/2	tox 10 A	
1	X2 70 =	0.8142	18.81	01-11	D z-V	
00 Yc = 50.16	7+0.8142X	oisithe h	equin	ed equ	ation:	
% Yc = 50.16	7 + 0.8142X	cissing &	equin	ed equ	ation:	
% Yc = 50.16	QUARE CAL		equin	ed equ	ation:	
cqin of sqies	QUARE CAL		equin	ed equ	ation:	
Cain of sales X = 2(	for 2004:	l overx 3x5	equin	ed equ	ation:	- 100
Cain of sales X = 2(	for 2004: t-2000.5).	l overx 3x5	equin		ation:	- 180 02
Cq1" of sq1es X = 2 ( = 2 (	for 2004: t-2000.5).	·5) = 7		(c		u
Cq1" of sq1es X = 2 ( = 2 (	for 2004: t-2000.5). (2004-2000	·5) = 7	e 59	866y (		02 02 20 20
Cq1" of sq1es X = 2 ( = 2 (	for 2004: (1-2000.5). (2004-2000) = 50.167+	·5) = 7	= 59 = 55	8664)	in 000)	3 11 3
Cq1n of sq1es X = 2( = 2(	for 2004: (1-2000.5). (2004-2000) = 50.167+	·5) = 7	= 59 = 55	8664)	in 000) (1000	3
Cq17 0   Sq1es X = 2 ( = 2 (	for 2004: (1-2000.5). (2004-2000) = 50.167+	5) = 7 0.8142X7	= 59 = 55	8664)	in 000) (1000	3
Cq17 0   Sq1es X = 2 ( = 2 (	for 2004: t-2000.5). (2004-2000 = 50.167+	5) = 7 0 8142X7	= 59 = 55	8664)	in 000) (1000	3
Can of sales X = 2( = 2 ( Can of sales X = 2 ( Can of sales	for 2004: 1-2000.5). (2004-2000 = 50.167+	5) = 7 0 8142X7 : 5)	= 59 = 55 = Rs	8664)	in 000) (1000 6.4	3

8.0 +F21.03 = 50.167+ 0.8	142x9 = 57.4948 (in 000)
	= 57.4948X1000
	= Rs. 57, 494.8
	The state of the s
the monthly basis tre	and equation is given by:
Yc = 50	167 + 0.8142 X
Acrigan	12 12 12 12
	181 + 0.00565 X
2077 Q. No. 1 (Brief)	rowedo to mile i someté
	(100m) 14 (20 m) 15 m
= Given:	
X = t-200	9
Y = 42+3	× ×
Sales for	2016=2 10 074511200
The second second	President A Laborate
X = t-200	9 = 2016-2009= 7
5° Yc = 424	-3X7
= Y2	+21 Of 1 Of 1
= 63	(in laks)
= 63	
The state of the s	

WD.

### \* Seasonal Index:

- 1. Simple Average Method
- 2. Multiplicative Model

# Simple Average Method: a minute product of the

Seasonal Index (91) = Average of Average X100

where,

Average = Sum of observations

Number of observations

### 2074 Old Q. NO.6

Solp

Calculation of Seasonal Indices Year Spring 8 Summer Fall winter 2012 10 ্ন 5 6 9 7 2013 10 2014 10 11 + 6 2015 10 12 8 11 9 2016 13 8 38 48 Total 56 32 Average(x) 9.6 11.2 6.4 SI 1.41114-1 00411

0944

guptos at ay

Working Note:			7	to this said	-1,217 -
U				1 1 2 1	Rod "
Average of Average =					
		average	_	730	14-50
3 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	9.6+1	1.2+7.6-	-6.4°	3.8	1
The Contract of the Contract o	1 >7	4	i.f	i tota	. 0
- Cure 12	8.7	100	54	1.841	
BLANT VELTER IN THE	Por	5-A	8P.	1.10	
Cain of Seasonal Index:			14		Total Laboratory
deline op by the company	evir ic a	13 7 5 3 P	(1)474	13 1/21/	The first
Seasonal Index (s	क्षेत्र = (1	Average		v 100	10 (0.4)
30300 0 2	Av	erage of A	verage		ar and a
	100		- 5 - 1		VS-S
Spring = 9.6 v	100 =	10:34	opaso.	2 14. Bu	
Spring = 9.6 X	Ayeres, A			520.0	77
	-,0-37201	eva , v.		i vee	-
Summer = 11.2	×100 = 1	28.74	T.		
8.7	CE at 1	01 4 1 4.0	E	P. M. Grays	
		7.376	6 1	+	
Fail = 7.6 X	too =	27.36		- x	
		14. 34.	2	E 157160	
		1 720340			
Winter = 6.4 x1	F = 00	3.5%	14-		· 8+
8.7	10 1	31 - 64-5		" York uples	
	- 1	17.46	F		
the seasonal Indices of s	sbring a	nd summi	er are	higher.	than
the base index whereas	of ton	and winte	r are	lower	- 0
than the base index.	1 1 311	120.346	3	* .	

### 2072(11) Q.NO. 14b.

Som

Calculation of seasonal Indices

Quarter	1988	1989	1990	1991	Total	$Average(\vec{x})$	IZ	
I	3.5	3.5	2.5	4.0	14.5	3.625	92.8	
П	3.9	4.1	3.9	4.6	16.5	4.125	105.6	
ĪŪ	3.4	3.7	3.7	3.8	14.6	3.65	9344	
<u>[v</u>	3.6	4.8	4.0	4.5	16.9	4.225	108.16	

Average of Average = Sum of Averages = 3.625+4.125+3.65+4.225

Number of averages 4

111000

Cain of seasonal Index (SI)

Seasonal Index = Average X100

Average of Average

Quarter 1 = 3.625 x 100 = 92.8

Quarter D = 4.125 ×100 = 105.6

Quarter 111 = 3.65 x 100 = 93.44

Quarter IV = 4-225 × 100 = 108.16

Soly				A right		1 1 25 2	
	Carc	ulation of	Seasonal I	ndices		Manager	1
Quarter	2008	2009	2010	2017	Total	Average(X)	12
I	y -	3.5	3.5	4	11	3.667	93.18
В	3.9	4-1	3.9	4.60	16.5	4.125	104.82
Ū	3.4	3.7	3.7	3.8	14.6	3.65	92.74
N	3.6	4.8	4.5		12-9	4.3	109-26
			and the second	W 7.5			路
Aver	age of Aver	nge =	Sum of Av	reroges	1 3.0	67+4.125-	+3.65+4
101	2 1	0	Number of			4	
499	71 12y700	ov 1 - 10-3		Lastypu ugyles-1		355	A CONTROL
	2.161	HI S	96	100			Service.
()	ain of seaso	nal Inde	(12) x	12,00	7-45-F	Seption .	100
	Concond I	ndex (st)	= Ave	rage	X10	0	di Bri
	Sequolia: 1		Averag	e of Ave	rage	3-60-1	(i+ 1907)
i daidi	Quarter 1		36	67×100		P-318	a March
4,014		4 - 4 - 4 -	3.93	55 CE	= 9	3.18	Charles.
						12 15 7	r la plur
To the same	Quarter o	1 = 1,07	= 104 4.12	5	- 10	4.82	18 [ 55 5
		12 X 2	3.93			102	
- 51	THE STATE OF THE S	(18)			Sario	(Ktop) Chil	100
	Quarter 1	Ū =	3.65		= 92		V t
			000 3.935	5 X100	Frat 152	115,000	
	10	lativit.			19	ALL LESS MAN	1
	Quarter J		ON 4.3		= 109	.26	
5	Name of		3.936	X 100	_ 103	70	-

Soly				A right		1 1 25 2	
	Carc	ulation of	Seasonal I	ndices		Manager	1
Quarter	2008	2009	2010	2017	Total	Average(X)	12
I	y -	3.5	3.5	4	11	3.667	93.18
В	3.9	4-1	3.9	4.60	16.5	4.125	104.82
Ū	3.4	3.7	3.7	3.8	14.6	3.65	92.74
N	3.6	4.8	4.5		12-9	4.3	109-26
			and the second	W 7.5			路
Aver	age of Aver	nge =	Sum of Av	reroges	1 3.0	67+4.125-	+3.65+4
101	2 1	0	Number of			4	
499	71 12y700	ov 1 - 10-3		Lastypu ugyles-1		355	A CONTROL
	2.161	HI ST	96	100			Service.
()	ain of seaso	nal Inde	(12) x	12,00	7-45F	Seption .	100
	Concond I	ndex (st)	= Ave	rage	X10	0	J. Bri
	Sequolia: 1		Averag	e of Ave	rage	3-60-1	(i+ 1907)
i daidi	Quarter 1		36	67×100		P-318	a March
4,014		4 - 4 - 4 -	3.93	55 CE	= 9	3.18	Charles.
						12 15 7	r la plur
To the same	Quarter o	1 = 1,07	= 104 4.12	5	- 10	4.82	18 [ 55 5
		12 X 2	3.93			102	
- 51	THE STATE OF THE S	(18)			Sario	(Ktop) Chil	100
	Quarter 1	Ū =	3.65		= 92		V t
			000 3.935	5 X100	Two First	115,000	
	10	lativit.			19	ALL LESS MAN	
	Quarter J		ON 4.3		= 109	.26	
5	Name of		3.936	X 100	_ 103	70	-

Now,	St. of the		1 - 1 - 64	1 112 114	11- p. 7 -	la must refer to
	usted st :	= Unadju	sted SIX K			
	87		.094	a-165 %	132 19	tin/fin/i-t
8	uarter I =	105.4X	0.998253	= 105.21	3 20	N - W
			DOF			
. 6	luarter D	= 95.47)	(0.998253	= 95.30		
G			L ETFUL		1	New College
8	luarter in	= 101.5	× 0.99825	3= 101.35	2	
					The state of	s to think!
8	luarter Iv	= 98.33	X 0.99825	3=98.17	10-00/2	
	12-15-16				14.	
s Sum	of Actiust	ed S1 = 100	21+95.30+	101.32+9	8.17 = 40	00
2 1					56/JE 3	
2067 Q-1	40.9	- PAL	1021.04	Notice E	T. NO.	
Solu					20 E	
	Calculat		isonal indices		tiplication	ve Model
			minated Va		3	the first terminal and
Year	Q <sub>1</sub>	Q2	Q3	Qu	2.00	737
2001	-		85.21	90.25	11 3750	
2002	128.12	91.72	85.13	106-14	3 23123	And Assayle C
2003	117.45	92.75	83.02	104.29	1 - 1 -	
2004	120.48	92.03	-,-	-	-	gun7.
Total	366.05	276.49	253.36	300.68	Total	
Average	122.02	92.16	84.45	100.23	398.86	4 - 9 - 9 - 9
(Unadjusted SI)			28.	for an		1
AdjustedsI	122.37	92.42	84.69	100.52	400	

Saturday Day of Samuelate.

				entire halv	The fire	
Adjustm	ent factor	(k) = _	400		-	
	1.	7. 8.01 :0	Sum of U	nadjusted s	SI I dill the	M. C.
		-	400			
	1.	T. 96	398.8	36	THE STATE	· ·
	- 12 - 12 -	=	1.00286			*
	1.1	101 : E	5280B;005	19-101 1	地方指加	1.55
Now,	To a two					
Adi	usted SI =	Unadio	sted SIX	K	VI YOUNGE	1
31.				4		
Fo	r Q = !	122.02X	1.00286	= 122.37	3400年	3 Mil
				7 100		131
Fo	r Q2 =	92.16 X 1	.00286	= 92.42		
			y = 1 74	1000	Party in	\$7. 7-
Fo	r : Q3 = 1	84.45 X	.00286 =	84.69	Cutedos	
		- " 25 ah	et berline	retion (sales)		1.2
Fo	r Qy = 1	00.23 X	00286	: 100.52	13	d den
	X-11	PLOF . :	10.8	1 43 4 4	11. 11.	
. Sumof ad	justed st :	122.37	+92.42+	84.69 + 10	0.52 = 4	00 : :

# 2061 Q. NO. 6 Partial

SOID

Month	2001	2002	2003	Total	Average(X)	SI	
Baisakh	12	15	. 16	43	14.33	104.88	
Jestha	11	19	- 15	40	13.33	97-56	
Ashadh	10	13	14	37	12.33	90-24	11 1
Shrawan.	19	76	16	46	15.33	112.20	The same
Bhadra	15	- 610	15	46	15.33	112.20	101
As win	15	15	17	47	15.67	114.69	Mr.
kartik	16	-17	16	49	16-33	119.52	8,00
Mangir	13	12	13	38	12.67	92.73	Will
Poush	11	13	10	34	11.33	82.92	10 Jet
Magh	04	12	10	32	10.67	78.09	all!
Falgun	12	13	11	36	12	87.83	I (in
Chaitra	15	- 14 -	15	44	14.67	107.37	11 -

Average of Average =	Sum of averages -	163.96	174
	no. of averages	12	= 73.6633

Calculation	of seasonal	Index:
= 12	Average	Y 100
7, 75, 75, 75, 75, 75	Average of .	

# \* Moving Average:

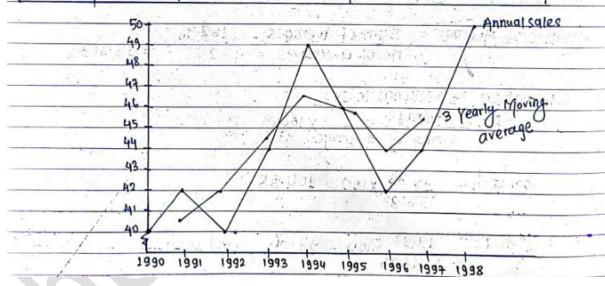
## 

Solution

	calculation	of 3- Yearly Moving	averages	Matte.
	Annual	3 - Yearly Moving	3- Yearly Moving	St B
Year	Sales (000)	Total	average	P1 1/
1990	40	- Mr Jr. 1.	1 0 -1 P1 3	17:
1991	42	122	40.67	6
1992	40	126	42	4
1993	44	133	44.33	13000
1994	49	139	46.33	ARCH.
1995	46	137	45.67	(Julio
1996	42	1328	44	3 (1)
1997	44	136	45.33	ter.
1998	50	2-11-1 - NA 12:5	alian en	14.

120000

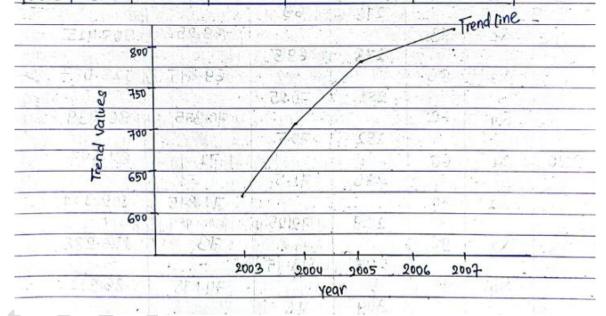
147 16



2502	LIA	1	10	1100
2047	OIC	( (1)	IV.	ND.U
	10	111/	W	(10.7

^	^	. In
-	n	(4)
_	٧.	

	alculation	n of 4- years	y centered r	moving average and	short-term fluctu	ations
Year	Profit	4- Years	4- Years	centered	short-term	
(t)	(000)	Moving	Moving	Moving	fluctuation	1.0
	(Y)	Total	average	Average (Yc)	Y-Yc	116
2001	506	-	-		5-1.2	1 202
2002	620				. C - 12	
2003	673	2387	596.75	620.5	52.5	
2004	588	2577	644-25	706.25	-118.25	
2005	696	3073	768.25	776.375	- 80.375	
2006	1116	3138	784.5	793.875	322.125	
2007	738	3213	803.25	Fr. Ho. OF Lot		
2008	663		30-1		248 E 27	1 100



2074 Q. NO. 17 (Analytical)

S0	D (10.21)	0		1 -		1,40 1
7		on of th	end values	using 4-0	juarly moving	average
	- 2655 3	pople :	4-quartely	4-quartery	centered	Trend eleminote
Year	Quarter	value	moving	moving	moving	value = Y X100
	1 3/	(1)	. total	average	average (Yc)	Yc Atab
2008	Q <sub>1</sub>	56	2.00		- 11- 1-1	305
0.0	Q2	70		and the second		1 - 12 - 1 - 1
	7.		266	66.5	6 Dec.	PI 1-SELL IN
	Q3	80	Y Grant	- 1- 14000	66.625	120.075
* .	3/2	19	267	66.75	91 - STUCE	1 de la
	Qq	60	THE SELECTION		67-125	89.385
			270	67.5	h.S. 1-1. E20E. 1	To the second
2009	QL	57	C. Million		68.25	83:516
	Sirie .	F. 1.	276	69		
	Q2	73			69.25	702-472
		***	278	69.5		303 943
	Q3	86	The Low		69.875	123.077
	7	1	281	70.25		W - 1
.*	Qy	62			70.375	88.099
		·	282	70.5		
2010	QL	60			15	84.507
1	5 Top 10		286	71.5		1.11
	Q2	74			71.875	102.957
			289	72.25		The same of the sa
	Q3	90		1523.25	73	123.288
	10	ey - Jek	295	73.75	02	120 200
	Qy	65	71		74.875	86.811
			304	25	14013	00.011

2011	QL	66		Digital Liv	75.625	87.273
		-	301	75.25		
	Q2	83	7 12 -	ingstall .	75.5	109.934
	1	20	303	75.75	A T	
	Qз	87	Trust	J. F E 10.18	t a	10411
					19	
	8y	67	ZETTOP!	Delight C	100	Ant of
	•	1 100	-	1		
		5 m 10 : =	2781000	X201 CC	1 10 712	1407

Calculation of Seasonal Indicies (s1)

Year		Trend Eli	minated val	100		
	Q1	Q2	Q3	Qq		
2008	= 4 F8 F	FOR THE FOU	120.035	89.385	-ought to	ortofiss.
2009	83.516	105.415	123.077	88.099		
2010	84.507	102.957	123-288	86.811	- 4000	122
2011	87.273	109.934	2	湿 一	1. 1994	
Total	255 296	318.306	366, 44	264.295	Total	19913
Average '	85.099	106.102	122-147	88.098	401.446	1 2
unadjustedss)				1.50	elforten	
12 betsuch	84.792	105.720	121.707	87.781	400	

Since Sum of unadjusted SI=401446 \$ 400, the adjustment

Adjustment Factor(K) = 400

Sum of Unadjusted SI

- 400

401.446 = 0.996398

Calculation	10	-4501	1911 (1)	· ·		,		_			-4-
Adjo	usted	12	- Una	djust	ed si	xk	- 61		5.0		
For	Q1	= 9	35.099	X 0.	9963	98 =	84.	792	-671		
										- 17	
For	02	Ξ.	06.10	2 X O.	99639	98 =	105.	720	17		
For	Q <sub>3</sub>	5 .	22.14	AXO.	9963	98 =	121.	707			-
For	Qq	= 1	88.098	2 X D. 9	39620	18 -	23	791	11 (-15)	17.00	
.°. Sum of ad		P. C		1 8			1 7	1	1.701	-400	-
	Justed	PC 3	3	321	71	711	21 40	710	1:101	- 900	100
Decision:	531	1,120-5	3 1.	30.8	211	1775	531	I	9/13	1.4	
the occup	าทเน	mto	n1 4	Olai	room	e io	Ð	and	0	200	
· lower -	than .	the	base	ind	ov h	1 15	ONE V	and	10.0	qie	
respec	tivett	1.	Dusc		CV 00	130.	2007.	una	1212	125	37.73
- 0.0	1	Lyt	Constitution of	505	001	. 1000	10.31	100	F 4/5		der-
the occup	anw	rate	of to	tot	room	c in	Q.	and	00	an	92
highe	-thay	1 Jus	bon	e 101	ve 1 (a	u 5	70.7	Cind	015	tan	
0.000	ective			11111	(		1-1.	4110	71.	1047.	

2072 Q.NOJ8 (Analytical)

Solp

money we should to calculate the growth rate of netprofit as well as consistency of net profit.

(	Computation	n fable	· PACKET		** T. T. T.				
Year		7.39	Comp	any A			Company	B	
(t)	X=t-200	4 X2	YA	XYA	YA2	YB	XYS	Yes	
2001	-3	9	76	-48	256	16	-48	256	
2002	-2	4	32	-69	1024	16	-32	256	
2003	-1	4	40	-40	1600	22	-22	484	
2004	0	0	24	0	576	36	0.0	1296	rif.
2005	1	1	40	40	1600	40	40	1600	E and
2006	2	4	32	64	1024	44	88	1936	***
2007	3	9	88	264	7744	48	144	2304	-
N=7	2X=0	≤X2=28	ZYA=272	ZXYA	ZYA2	ZYB	ZXYg	ZYB2	
7.7		STATE		= 216	=13824	= 222	= 170	= 8132	

Calculation of annual growth rate:

$$D_A = ZXYA = 216$$
 28 = 7-71 (in million)

$$b_8 = \frac{2}{2} \frac{2}{2} = \frac{170}{28} = 6.07 \text{ (in million)}$$

Since the annual arount	h rate of company A is greater ny B. I would invest in Net
than that at comban	ou a r would invest in
Consessu A diale	Objet on amount ante in Net
company of age to	19 xilgher growth rate in 1900
profit.	AND SECTION OF DESCRIPTIONS OF SECTION
0	
Calculation of coefficien	it of Variation of net profit:
	e e la
Company A.	AN AND AND AND AND AND AND AND AND AND A
NY AVX	Tar Are Are are sylvator
Mean (YA)= 2YA = 27	2 6 4
10 AOE 20H	= 38.86 (in million)
1 24 TO - 2 2 4 S	many to be a superior to the superior
Standard Deviation (GA) = 2	EYA2 / EYA12
State Old Seviation (-#) = 2	N (N)
70 00 144	tales of the second of the sec
1120 Jun 50 7	$3824. (272)^2 = 21.56 (in million)$
	3824. (242)2 = 21.56 (in million)
21.2	THE VINE ASSESSMENT OF THE PROPERTY OF THE PRO
	And I - color in the second in
Coefficient of Variation (C)	$(A) = 6A \times 100$
	ScriptoYAS Cott minas Higorication
	- 21.56 x 100
	= 21.56 × 100
	= 55.48%
(and)	(u nic) 2/4/ 5-3-4/ 5-5-
	117
	71 Or (14 (15) (15) (15)
	"York Tables : To The York I

# Company is Mean (Ye) = $\frac{2}{1}$ = $\frac{2}{1}$ = $\frac{2}{1}$ (in minion) Standard Deviation (E) = $\frac{2}{1}$ = $\frac{2}{1}$ = $\frac{2}{1}$ (in minion) = $\frac{2}{1}$ = $\frac{2$

Moshoiles. Coll