TIME SERIES ANALYSIS
PRACTICAL – 3

Submitted By: Ridam Singhal(5040)

AIM: To compute seasonal indices by ratio to moving average method.

EXPERIMENT:

The Airport authorities collected data on the number of aircrafts, which could not fly on time from Delhi airport due to adverse weather conditions from 2001 to 2004. The number of aircrafts per month for the period are shown in the following table. Compute seasonal indices by ratio to moving average method.

Year	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
No. of Aircrafts	95	81	66	52	53	58	65	54	82	90	98	112

Year	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
No. of Aircrafts	87	81	65	67	35	39	23	58	74	98	101	112

Year	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003	2003
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
No. of Aircrafts	110	102	98	78	65	68	65	58	68	76	128	135

Year	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
No. of Aircrafts	98	88	58	54	40	59	75	54	68	87	121	132

THEORY:

Moving average eliminates periodic movement if the extent (period of moving average), is equal to the period of the oscillatory movements sought to be eliminated. Thus, for a monthly data, a 12-month moving average should completely eliminate the seasonal movements if they are of constant patterns and intensity. This method involves the following steps:

1. This method is based on calculating moving averages by considering n = 12 for monthly data, and n = 4 for quarterly data.
2. For monthly data first calculate the successive averages for the groups of size 12 and then take a 2-point moving average of these averages.
3. Convert the data series as the percentages of the 2-point moving average values i.e. ((given data)/(2-point moving average)*100).
4. These percentages would now represent seasonal variations along with random components.
5. The random component is eliminated by averaging these monthly percentages.
6. Adjusted seasonal indices are computed to make the sum of the indices 1200 or 400 by multiplying them throughout by a correction factor k.

CALCULATIONS:

Table-5.1

YEAR	MONTH	NO. OF AIRCRAFTS	12 POINT MOVING AVG	2 POINT MOVING AVG	RATIO TO MOVING AVG.
2001	JAN	95			
2001	FEB	81			
2001	MAR	66			
2001	APR	52			
2001	MAY	53			
2001	JUN	58			
				75.5	
2001	JUL	65		75.16666667	86.47450111
			74.83333333		
2001	AUG	54		74.83333333	72.16035635
			74.83333333		
2001	SEP	82		74.79166667	109.637883
			74.75		
2001	OCT	90		75.375	119.4029851
			76		

Year	Month				
2001	NOV	98		75.25	130.2325581
			74.5		
2001	DEC	112		73.70833333	151.9502544
			72.91666667		
2002	JAN	87		71.16666667	122.2482436
			69.41666667		
2002	FEB	81		69.58333333	116.4071856
			69.75		
2002	MAR	65		69.41666667	93.63745498
			69.08333333		
2002	APR	67		69.41666667	96.51860744
			69.75		
2002	MAY	35		69.875	50.08944544
			70		
2002	JUN	39		70	55.71428571
			70		
2002	JUL	23		70.95833333	32.41338814
			71.91666667		
2002	AUG	58		72.79166667	79.67945049
			73.66666667		
2002	SEP	74		75.04166667	98.61188229
			76.41666667		
2002	OCT	98		76.875	127.4796748
			77.33333333		
2002	NOV	101		78.58333333	128.5259809
			79.83333333		
2002	DEC	112		81.04166667	138.2005141
			82.25		
2003	JAN	110		84	130.952381
			85.75		
2003	FEB	102		85.75	118.9504373
			85.75		
2003	MAR	98		85.5	114.619883
			85.25		
2003	APR	78		84.33333333	92.49011858
			83.41666667		
2003	MAY	65		84.54166667	76.88516511
			85.66666667		
2003	JUN	68		86.625	78.4992785
			87.58333333		
2003	JUL	65		87.08333333	74.64114833
			86.58333333		
2003	AUG	58		86	67.44186047
			85.41666667		
2003	SEP	68		83.75	81.19402985
			82.08333333		

2003	OCT	76			81.08333333	93.7307297
				80.08333333		
2003	NOV	128			79.04166667	161.9399051
				78		
2003	DEC	135			77.625	173.9130435
				77.25		
2004	JAN	98			77.66666667	126.1802575
				78.08333333		
2004	FEB	88			77.91666667	112.9411765
				77.75		
2004	MAR	58			77.75	74.59807074
				77.75		
2004	APR	54			78.20833333	69.04635056
				78.66666667		
2004	MAY	40			78.375	51.03668262
				78.08333333		
2004	JUN	59			77.95833333	75.68145377
				77.83333333		
2004	JUL	75				
2004	AUG	54				
2004	SEP	68				
2004	OCT	87				
2004	NOV	121				
2004	DEC	132				

(Table 5.2) SEASONAL INDICES:

	YEAR					ADJUSTED SEASONAL
MONTH	2001	2002	2003	2004	SEASONAL INDICES	INDICES
JAN		122.2482	130.9524	126.1803	126.460294	127.0203612
FEB		116.4072	118.9504	112.9412	116.0995998	116.6137816
MAR		93.63745	114.6199	74.59807	94.28513625	94.70270617
APR		96.51861	92.49012	69.04635	86.01835886	86.39931688
MAY		50.08945	76.88517	51.03668	59.33709772	59.5998898
JUN		55.71429	78.49928	75.68145	69.96500599	70.27486694
JUL	86.4745	32.41339	74.64115		64.50967919	64.79537959
AUG	72.16036	79.67945	67.44186		73.0938891	73.41760724
SEP	109.6379	98.61188	81.19403		96.48126505	96.90856118
OCT	119.403	127.4797	93.73073		113.5377965	114.0406326
NOV	130.2326	128.526	161.9399		140.2328147	140.8538777
DEC	151.9503	138.2005	173.913		154.6879373	155.3730191
SUM=					1194.708875	1200

CorrectionFactor(k)=	1.004428799

An excel sheet has also been attached for reference to the calculations.

RESULT:

- The seasonal and adjusted indices calculated by ratio to moving average method have been shown in Table 5.2.
- The value of correction factor(k) is coming out to be 1.04428799.