TIME SERIES ANALYSIS

PRACTICAL – 4

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AIM: To compute monthly seasonal indices by ratio seasonal method.

PRACTICAL:

The data given in the following table shows the monthly production of wool (in .000 tons) by state industries from Jan 2001 to Dec. 2005. Compute the monthly seasonal indices by ratio to trend method.

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2001	156.75	133.65	108.90	85.80	87.45	95.70	107.25	89.10	135.30	148.50	161.70	184.80
2002	185.31	172.53	138.45	142.71	74.55	83.07	48.99	123.54	157.62	208.74	215.13	238.56
2003	306.90	284.58	273.42	217.62	181.35	189.72	181.35	161.82	189.72	212.04	357.12	376.65
2004	305.76	274.56	180.96	168.48	124.80	184.08	234.00	168.48	212.16	271.44	377.52	411.84
2005	349.87	324.42	311.70	248.09	206.74	216.28	206.74	184.47	216.28	241.73	407.12	429.38

THEORY:

RATIO TO TREND METHOD

1. Based on Multiple models of Time Series.
2. We assume that seasonal variation for any given month is constant factor of trend.

STEPS:

1. Calculate the trend values for various time durations (Quarterly/Monthly) using Least Square method and fitting the appropriate mathematical curve.
2. Express all the original data as the percentage of trend on the basis of the following formula. (Original Data/Trend Value)*100.
3. Calculate the seasonal variation indices.

Linear Equation:

- y=ax+b.

CALCULATIONS:

Table 4.1

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL	AVERAGE	X	trend values
2001	156.75	133.65	108.9	85.8	87.45	95.7	107.25	89.1	135.3	148.5	161.7	184.8	1494.9	124.575	-2	127.5413333
2002	185.31	172.53	138.45	142.71	74.55	83.07	48.99	123.54	157.62	208.74	215.13	238.56	1789.2	149.1	-1	167.7216667
2003	306.9	284.58	273.42	217.62	181.35	189.72	181.72	161.82	189.72	212.04	357.12	376.65	2932.66	244.388333	0	207.902
2004	305.76	274.56	180.96	168.48	124.8	184.08	234	168.48	212.16	271.44	377.52	411.84	2914.08	242.84	1	248.0823333
2005	349.87	324.42	311.7	248.09	206.74	216.74	206.74	184.47	216.28	241.73	407.12	429.38	3343.28	278.606667	2	288.2626667

As
y=ax+b
Therefore,

	Coefficients
Intercept	207.902
X	40.18033

We get,

avg yearly increment=	40.18033333
monthly increment=	3.348361111

Table 4.2

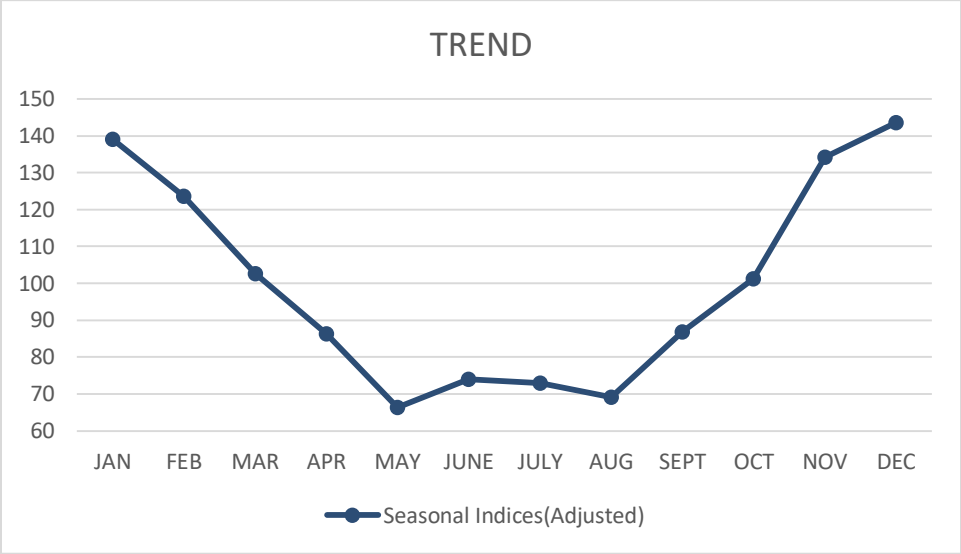
						MONTHLY TREND VALUES						
YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
2001	109.1253	112.4737	115.8221	119.1704	122.5188	125.8672	129.2155	132.5639	135.9122	139.2606	142.609	145.9573
2002	149.3057	152.654	156.0024	159.3508	162.6991	166.0475	169.3958	172.7442	176.0926	179.4409	182.7893	186.1377
2003	189.486	192.8344	196.1827	199.5311	202.8795	206.2278	209.5762	212.9245	216.2729	219.6213	222.9696	226.318
2004	229.6663	233.0147	236.3631	239.7114	243.0598	246.4082	249.7565	253.1049	256.4532	259.8016	263.15	266.4983
2005	269.8467	273.195	276.5434	279.8918	283.2401	286.5885	289.9368	293.2852	296.6336	299.9819	303.3303	306.6787

Table 4.3

						TREND ELIMINATED VALUES						
YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
2001	143.6422	118.8278	94.02353	71.99773	71.37681	76.03255	83.00087	67.21288	99.54954	106.6346	113.387	126.6124
2002	124.1145	113.0203	88.74863	89.55715	45.82078	50.02786	28.92043	71.51615	89.50974	116.328	117.6929	128.1632
2003	161.9645	147.5774	139.3701	109.0657	89.38805	91.99535	86.70833	75.99875	87.7225	96.54803	160.1653	166.4251
2004	133.1323	117.8295	76.56018	70.28451	51.34539	74.70532	93.69125	66.56529	82.72853	104.4797	143.4619	154.5376
2005	129.6551	118.7503	112.7129	88.63784	72.99107	75.6276	71.30518	62.89782	72.91151	80.58152	134.2167	140.0097
Seasonal Indices(Average)	**138.5017**	**123.2011**	**102.2831**	**85.90858**	**66.18442**	**73.67773**	**72.72521**	**68.83818**	**86.48436**	**100.9144**	**133.7848**	**143.1496**
Seasonal Indices(Adjusted)	139.0052	123.649	102.6549	86.22092	66.42504	73.9456	72.98961	69.08845	86.79879	101.2813	134.2712	143.67

sum(Seasonal Average Indices)=	**1195.653037**
k=	1.003635639

Graph 4.1



RESULT:

- Sum of seasonal indices is observed to be 1195.653037. We obtain the value of k by diving 1200 by the sum of average seasonal indices.
- Adjusted seasonal indices are obtained by multiplying the average seasonal indices by the correlation factor k.
- Graph for average and adjusted indices has been plotted in Graph 4.1.

CONCLUSION:

- The positive value of monthly increment (3.348361111) indicates that there is an increasing trend.
- Average production of wool for years 2001-2005 is maximum in the month of January. After that, it gradually decreases from February to August and then starts increasing from September. It achieves a maximum in December.
- For year 2001, maximum production is observed in the month of January, whereas for years 2002- 2005, maximum production month is December.