7. A family budget enquiry revealed that the average expenditure of the families on food, clothing, house rent, fuel and Miscellaneous are 30%, 10%, 20%, 15% and 25% respectively. If the respective group indices are 160, 170, 150, 220 and 200. Find the consumer price index number.

Ans : 178

6. Time Series-I

1. For the following data find 3 yearly moving averages.

Year	2005	2006	2007	2008	2009	2010	2011
Sales	30	36	39	33	39	45	42

2. Calculate the trend values by finding three yearly moving averages.

Year	2006	2007	2008	2009	2010	2011	2012
Sales (in thousand Rs.)	123	106	124	130	145	143	132

3. Compute 4 yearly moving averages for the following data.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Value	100	102	104	101	106	103	101	100	102

4. From the following data obtain the trend values by finding four yearly moving averages:

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
Profit	12	16	8	20	24	36	32	40	42

5. Compute five yearly moving averages for the following data.

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006
Sales	75	60	55	60	65	70	70	75	85

6. Calculate the trend values by finding 5 yearly moving averages.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Value	10	12	8	10	16	12	14	10	11

7. Time Series-II

1. Below are given the figures of production (in thousand quintals) of a sugar factory.

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

a. Fit a straight line trend to these figures.

b. Estimate the production for the year 2008.

c. Compute the trend values.

Ans: a=90, b=2, trend: 84, 86, 88, 90, 92, 94, 96. Y_{2008}=98.

2. Production figures of a sugar factory in 1000 quintals are given below:

Year	1998	2000	2002	2004	2006	2008	2010
Production	12	10	14	11	13	15	16

a. Fit a straight line trend to the above data.

b. Plot these figures on a graph and show the trend line.

c. Estimate the production for 2012.

Ans: a=13, b=0.75, trend: 10.75, 11.5, 12.25, 13, 13.75, 14.5, and 15.25. Y_{2012}=16.

3. Following data gives the population of a city.

a. Fit a linear trend and find the trend values.

b. Estimate the population in 2011.

Year	1951	1961	1971	1981	1991	2001
Population (' 000)	80	100	110	120	140	152

Ans: a=117, b=7, trend: 82, 96, 110, 124, 138, 152. Y_{2011}=166.

4. Fit y = a + bx from the straight line trend to the data plot the original and trend values on graph.

Year	2002	2004	2006	2008	2010	2012
Values	6	7	6	9	11	9

Ans: a=8, b=0.43.

Time Series-III

1. Fit a Parabolic trend to the following time series and estimate the profit for the year 2007.

Year	1998	1999	2000	2001	2002	2003	2004
Profit	50	60	55	61	72	73	75

Ans: a=63.71, b=4.21 and c=0.

2. For the following time series fit a parabolic trend of the type $y=a+bx+cx^2$ by the method of least squares. Estimate the production in 2009.

Year	2002	2003	2004	2005	2006	2007	2008
Production (tons)	8	10	11	12	14	15	17

Ans: a=12.35, b=1.43 and c=0.02

3. Fit a second degree equation of the form $y=a+bx+cx^2$ to the following data regarding profits and estimate the profit for the year 2010.

Year	2005	2006	2007	2008
Profits (in Rs.'000')	10	12	13	10

Ans: a=12.8, b=0.05 and c=-0.31

4. The following table gives the profits of a concern for 5 years ending 2009:

Year	2005	2006	2007	2008	2009
Profits (in Rs. Thousands)	1.6	4.5	13.8	40.2	125

Fit an equation of the type $y=ab^x$.

Ans: log a= 1.1397, log b= 0.474.

8. From the following data, obtain the value of y when x = 9 by using Newton's forward difference method:

X	3	7	11	15	19
Y	42	43	47	53	60

Ans: $y_9 = 44.6873$

9. Calculate y when x is 12 from the following by interpolation method:

X	10	20	30	40	50
Y	23	30	34	37	39

Ans: $y_{12} = 24.9632$

10. Below are given the wages eassrned by workers per day in a certain town. Calculate the number of workers earning up to Rs.750 per week.

Wages per day upto (Rs.)	500	600	700	800	900	1000
No. of workers	50	150	300	500	700	800

Ans: $y_{750} = 396$

11. Theoretical Distributions-I (Binomial Distribution)

1. The probability that a bomb hits the target is 1/4. Five bombs are aimed at the target. Find the probability that
   i. 3 bombs hit the target.
   ii. at the most two bombs hit the target.

Ans: 90/1024, 918/1024

2. In a college, 70% of the students are boys. In a random sample of 6 students, find the probability of
   i. two boys.
   ii. at least one boy

Ans: 0.0595,0.9993.

player A has probability 3/5 of winning a game of chess with player B. If they play 4 games, find the probability that player A wins at least 3 games. Ans: 0.4752

The probability of an arrow hitting a tree is ¼. If 3 arrows are aimed at the tree, find the probability that

i. two arrows miss the tree.

ii. at least one arrow hit the tree. Ans: 0.4219, 0.5781.

In a certain locality it is known that (1/5)th of the taxis have defective meters. Assuming 50 investigators take a sample of 7 taxis each to see if their meters are defective. How many investigators will report

i. exactly 4 taxis have defective meters.

ii. at the most 3 taxis have defective meters. Ans: 1, 48.

If on an average one ship in every 10 is sunk, find the chance that out of 5 ships at least 4 will arrive safely. Ans: 0.9186

In a certain school 40% of the students have opted for first language kannada. Assuming 20 teachers take a sample of 4 students each, how many teachers will report that 2 or 3 students opted for first language kannada. Ans: 10

12. Theoretical Distributions-II