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REDUCED Applied Statistics

12th Standard

Business Maths

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48 x 1 = 48

1) A time series is a set of data recorded
(a) Periodically (b) Weekly (c) successive points of time (d) all the above

2) A time series consists of
(a) Five components (b) Four components (c) Three components (d) Two components

3) The components of a time series which is attached to short term fluctuation is
(a) Secular trend (b) Seasonal variations (c) Cyclic variation (d) Irregular variation

4) Factors responsible for seasonal variations are
(a) Weather (b) Festivals (c) Social customs (d) All the above

5) The additive model of the time series with the components T, S, C and I is
(a) $y=T+S+C\times I$ (b) $y=T+S\times C\times I$ (c) $y=T+S+C+I$ (d) $y=T+S\times C+I$

6) Least square method of fitting a trend is
(a) Most exact (b) Least exact (c) Full of subjectivity (d) Mathematically unsolved

7) The value of 'b' in the trend line $y=a+bx$ is
(a) Always positive (b) Always negative (c) Either positive or negative (d) Zero

8) The component of a time series attached to long term variation is trended as
(a) Cyclic variation (b) Secular variations (c) Irregular variation (d) Seasonal variations

9) The seasonal variation means the variations occurring with in
(a) A number of years (b) within a year (c) within a month (d) within a week

10) Another name of consumer's price index number is:
(a) Whole-sale price index number (b) Cost of living index (c) Sensitive (d) Composite

11) Cost of living at two different cities can be compared with the help of
(a) Consumer price index (b) Value index (c) Volume index (d) Un-weighted index

12) Laspeyre's index = 110, Paasche's index = 108, then Fisher's Ideal index is equal to:
(a) 110 (b) 108 (c) 100 (d) 109

13) Most commonly used index number is:
(a) Volume index number (b) Value index number (c) Price index number (d) Simple index number

14) Consumer price index are obtained by:
(a) Paasche's formula (b) Fisher's ideal formula (c) Marshall Edgeworth formula (d) Family budget method formula

15) Which of the following Index number satisfy the time reversal test?
(a) Laspeyre's Index number (b) Paasche's Index number (c) Fisher Index number (d) All of them

16) While computing a weighted index, the current period quantities are used in the:
(a) Laspeyre's method (b) Paasche's method (c) Marshall Edgeworth method (d) Fisher's ideal method

17) The quantities that can be numerically measured can be plotted on a
(a) p - chart (b) c – chart (c) x bar chart (d) np – chart

18) How many causes of variation will affect the quality of a product?
(a) 4 (b) 3 (c) 2 (d) 1

19) Variations due to natural disorder is known as
(a) random cause (b) non-random cause (c) human cause (d) all of them

20) The assignable causes can occur due to
(a) poor raw materials (b) unskilled labour (c) faulty machines (d) all of them

21) The component of a time series which is attached to short term fluctuations is
(a) Seasonal variations (b) Cyclic variation (c) Irregular variation (d) all the above

22) Cyclic variations in a time series are caused by
(a) Lock out in a factor (b) war (c) floods (d) none of above

23) The terms prosperity, recession, depression and recovery are in particular attached to
(a) Secular trend (b) Seasonal fluctuation! (c) Cyclic movements (d) irregular variation

24) A decline in the sales of ice cream during November to March is associated with
(a) Seasonal variation (b) Cyclical variation (c) random variation (d) Secular trend

25) Index number is a
(a) Measure of relative changes (b) Special type of an average (c) a percentage relative (d) all the above

26) Index numbers are expressed in terms of
(a) percentages (b) ratios (c) absolute value (d) all the above

27) Most commonly used index numbers are _____ index number
(a) diffusion (b) price (c) value (d) none ofthese

28) Chance variation in the manufactured product is
(a) controllable (b) not controllable (c) both (a) and (b) (d) none of these

29) Variation due to assignable causes in the product occur due to, _____
(a) faulty process (b) carelessness of operators (c) poor quality of raw material (d) all the above.

30) The causes leading to vast variation in the specification of a product are usually due to _____
(a) random process (b) assignable causes (c) non-traceable causes (d) all the above

31) Most frequently used index number formulae are_____
(a) weighted (b) unweighted (c) fixed weighted (d) non of these

32) An additive model of time series with the components T, S, C and I is
(a) $y = T + S + C - I$ (b) $y = T + S \times C + I$ (c) $y = T + S + C + I$ (d) $y = T + S + C \times I$

33) The normal equations for estimating a and b so that the line y = ax + b may be the line of best fit are
(a) $a\Sigma x^2 + b\Sigma x = \Sigma xy$, $a\Sigma x + nb = \Sigma y$ (b) $a\Sigma x + b\Sigma x^2 = \Sigma xy$, $a\Sigma x^2 + nb = \Sigma y$ (c) $a\Sigma x + nb = \Sigma xy$, $a\Sigma x^2 + b\Sigma x = \Sigma y$ (d) $a\Sigma x^2 + nb = \Sigma xy$, $a\Sigma x + b\Sigma x = \Sigma y$

34) In a line of best fit y = 5.8 (x - 1994) + 41.6, the value of y when x = 1997 is _____
(a) 50 (b) 54 (c) 59 (d) 60

35) Fine data relating to x and yare to be fit in a straight line. It is found that $\Sigma x = 0$ and $\Sigma y = 15$. Then the y- intercept of the line is_____
(a) 1 (b) 2 (c) 3 (d) 42

36) The normal equations of fitting a straight line y = ax+ b are 10a + 5b = 15 and 30a + 10b = 43. The slope of the line of best fit is _____
(a) 1.2 (b) 1.3 (c) 13 (d) 12

37) The normal -equations in fitting a line y = ax + b, by the method of least squares over n points are 4 = 4a + b and Σxy = 120a + 24b. Then n = _____
(a) 30 (b) 5 (c) 6 (d) 4

38) Chance variation does not affect _____ of the product
(a) price (b) value (c) quantity (d) quality

39) Choose the odd one out
(a) Secular trend (b) seasonal variation (c) Simple averages (d) cyclic variations

40) Choose the odd one out
(a) Price index number (b) Quantity index number (c) cost of living index number (d) Ideal index number

41) Aggregate expenditure method

(a) CLI = $\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$ (b) weighted aggregative method (c) used when price and weight are given (d) it is used when price & quantity are given

42) Choose the odd one out
(a) Diagnose the lack of quality in raw material (b) Identify the lack of quality in machines (c) To check whether the end product has the quality what the consumer expects from the manufacturer (d) To compare the cost ofliving with the current year

43) Choose the odd one out
(a) It aims at a certain quality level to be guaranteed to the customers (b) It is easy to interpret (c) It is easy to construct (d) It has three control lines

44) Time series consists of data arranged
(a) Statistical methods (b) Chronologicallyoccurrence (c) Order oftheir (d) increasing or decreasing order

45) Seasonal variations are
(a) Selling of umbrellas in rainy season (b) cool drinks in summer season (c) Prices of electronic gadgets (d) Sugarcane in Pongal

46) The components used in the time series y = T + S + C + I are
(a) seasonal (b) secular (c) trend value (d) original value

47) The methods of measurements of trends are
(a) Graphic (b) semi averages (c) least squares (d) control charts

48) Seasonal variations can be measured when the data are available in season wise
(a) weeks (b) days (c) months (d) Quarters

32 x 2 = 64

49) Fit a trend line by the method of freehand method for the given data

Year	2000	2001	2002	2003	2004	2005	2006	2007
Sales	30	46	25	59	40	60	38	65

50) Fit a trend line by the method of semi-averages for the given data.

Year	1990	1991	1992	1993	1994	1995	1996	1997
Sales	15	11	20	10	15	25	35	30

51) A machine drills hole in a pipe with a mean diameter of 0.532 cm and a standard deviation of 0.002 cm. Calculate the control limits for mean of samples 5.

52) Define Time series.

53) What is the need for studying time series?

54) State the uses of time series.
55) Mention the components of the time series.
56) Define secular trend.
57) Explain cyclic variations.
58) Discuss about irregular variation
59) Define seasonal index.
60) State the two normal equations used in fitting a straight line.
61) Find the trend of production by the method of a five-yearly period of moving average for the following data:

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Production(‘000)	126	123	117	128	125	124	130	114	122	129	118	123

62) The following table gives the number of small-scale units registered with the Directorate of Industries between 1985 and 1991. Show the growth on a trend line by the free hand method.

Years	1985	1986	1987	1988	1989	1990	1991	1992
No. of units (in‘000)	10	22	36	62	55	40	34	50

63) Define Index Number
64) State the uses of Index Number.
65) Mention the classification of Index Number.
66) Define Laspeyre’s price index number.
67) Explain Paasche’s price index number.
68) Write note on Fisher’s price index number
69) State the test of adequacy of index number.
70) Define Time Reversal Test.
71) Explain Factor Reversal Test.
72) Define true value ratio.
73) Discuss about Cost of Living Index Number.
74) Define Family Budget Method.
75) State the uses of Cost of Living Index Number.
76) Using the method ofleast squares, fit a straight line trend for $\Sigma x = 10$, $\Sigma y = 16.9$, $\Sigma x^2 = 30$, $\Sigma xy = 47.4$ and $n = 7$.
77) Calculate the 3-yearlymoving averages of the production figures (in tonnes) for the following data.

Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Production	15	21	30	36	42	46	50	56	63	70	74	82	90	95	102

78) Calculate the seasonal indices by the method of simple average for the following data.

Year	I quarter	II quarter	III quarter	IV quarter
1985	68	62	61	63
1986	65	58	66	61
1987	68	63	63	67

79) Calculate the cost of living index by aggregate expenditure method

Commodity	Quantity	Price(Rs.)	
	2000	2000	2003
A	100	8	12
B	25	6	7.50

C	10	5	5.25
D	20	48	52
E	65	15	16.50
F	30	19	27.00

80) Construct the cost of living index for 2003 on the basis of 2000 from the following data using family budget method.

Item	Price(Rs.)		Weights
Food	2000	2003	30
Rent	200	280	30
Clothing	150	120	20
Fuel & lighting	50	100	10
Miscellaneous	100	200	20

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20 x 3 = 60

81) Fit a trend line by the method of semi-averages for the given data.

Year	2000	2001	2002	2003	2004	2005	2006
Production	105	115	120	100	110	125	135

82) Calculate three-yearly moving averages of number of students studying in a higher secondary school in a particular village from the following data.

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Number of students	332	317	357	392	402	405	410	427	435	438

83) Calculate four-yearly moving averages of number of students studying in a higher secondary school in a particular city from the following data.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Sales	124	120	135	140	145	158	162	170	175

84) The following data gives readings of 10 samples of size 6 each in the production of a certain product. Draw control chart for mean and range with its control limits.

Sample	1	2	3	4	5	6	7	8	9	10
Mean	383	508	505	582	557	337	514	614	707	753
Range	95	128	100	91	68	65	148	28	37	80

85) You are given below the values of sample mean ($\bar{X}$) and the range (R) for ten samples of size 5 each. Draw mean chart and comment on the state of control of the process.

Sample number	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	43	49	37	44	45	37	51	46	43	47
R	5	6	5	7	7	4	8	6	4	6

Given the following control chart constraint for :n=5, A_2=0.58, D_3=0 and D_4=2.115

86) Write a brief note on seasonal variations

87) Explain the method of fitting a straight line.

88) State the different methods of measuring trend.

89) The following figures relates to the profits of a commercial concern for 8 years

Year	1986	1987	1988	1989	1990	1991	1992	1993
Profit (Rs.)	15,420	15,470	15,520	21,020	26,500	31,950	35,600	34,900

Find the trend of profits by the method of three yearly moving averages.

90) Calculate by a suitable method, the index number of price from the following data:

Commodity	2002		2012	
	Price	Quantity	Price	Quantity
A	10	20	16	10
B	12	34	18	42
C	15	30	20	26

91) Using three yearly moving averages, Determine the trend values from the following data.

Year	Profit	Year	Profit
2001	142	2007	241
2002	148	2008	263
2003	154	2009	280
2004	146	2010	302
2005	157	2011	326
2006	202	2012	353

92) From the following data, calculate the trend values using fourly moving averages.

Year	1990	1991	1992	199	1994	1995	1996	1997	1998
Sales	506	620	1036	673	588	696	1116	738	663

93) Compute the consumer price index for 2015 on the basis of 2014 from the following data.

Commodities	Quantities	Prices in 2015	Prices in 2016
A	6	5.75	6.00
B	6	5.00	8.00
C	1	6.00	9.00
D	6	8.00	10.00
E	4	2.00	1.50
F	1	20.00	15.00

94) An Enquiry was made into the budgets of the middle class families in a city gave the following information.

Expenditure	Food	Rent	Clothing	Fuel	Rice
Price(2010)	150	50	100	20	60
Price(2011)	174	60	125	25	90
Weights	35	15	20	10	20

What changes in the cost of living have taken place in the middle class families of a city?

95) Fit a straight line trend for the following data using the method ofleast squares.

x	0	1	2	3	4
y	1	1	3	4	6

96) Fit a trend line to the following data by graphic method.

Year	1978	1979	1980	1981	1982	1983	1984	1985	1986
Production of steel	20	22	24	21	23	25	23	26	25

97) Find a trend line to the following data by the method of sami-averages.

Years	1980	1981	1982	1983	1984	1985	1986
Sales	102	105	114	110	108	116	112

98) Calculate the seasonal indices for the following data by the method of simple average.

Year	Quarters			
	I	II	III	IV
1994	78	66	84	80
1995	76	74	82	78
1996	72	68	80	70
1997	74	70	84	74
1998	76	74	86	82

99) Compute Fisher's price index number for the following data.

Commodity	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	10	12	12	15
B	7	15	5	20
C	5	24	9	20
D	16	5	14	5

100) From the data given below, construct a cost of living index number by family budget method for 1986 with 1976 as the base year.

Commodity	P	Q	R	S	T	U
Quantity in 1976	50	25	10	20	30	40
Price in 1976 (Rs)	10	5	8	7	9	6
Price in 1986 (Rs)	6	4	3	8	10	12

43 x 5 = 215

101) Given below are the data relating to the production of sugarcane in a district. Fit a straight line trend by the method of least squares and tabulate the trend values.

Year	2000	2001	2002	2003	2004	2005	2006
Prod. of Sugarcane	40	45	46	42	47	50	46

102) Given below are the data relating to the sales of a product in a district. Fit a straight line trend by the method of least squares and tabulate the trend values.

Year	1995	1996	1997	1998	1999	2000	2001	2002
Sales	6.7	5.3	4.3	6.1	5.6	7.9	5.8	6.1

103) Calculate the seasonal index for the monthly sales of a product using the method of simple averages.

Months / Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2001	15	41	25	31	29	47	41	19	35	38	40	30
2002	20	21	27	19	17	25	29	31	35	39	30	44
2003	18	16	20	28	24	25	30	34	30	38	37	39

104) Calculate the seasonal index for the quarterly production of a product using the method of simple averages.

Year	I Quarter	II Quarter	III Quarter	IV Quarter
2005	255	351	425	400
2006	269	310	396	410
2007	291	332	358	395
2008	198	289	310	357
2009	200	290	331	359
2010	250	300	350	400

105) the Laspeyre's, Paasche's and Fisher's price index number for the following data. Interpret on the data.

Commodities	Price		Quandity	
	2000	2010	2000	2010
Rice	38	35	6	7
Wheat	12	18	7	10
Rent	10	15	10	15
Fuel	25	30	12	16
Miscellaneous	30	33	8	10

106) Construct the Laspeyre's , Paasche's and Fisher's price index number for the following data. Comment on the result.

Commodities	Base Year		Current Year	
	Price	Quantity	Price	Quantity
Rice	15	5	16	8
Wheat	10	6	18	9
Rent	8	7	15	8
Fuel	9	5	12	6
Transport	11	4	11	7
Miscellaneous	16	6	15	10

107) Calculate Fisher's price index number and show that it satisfies both Time Reversal Test and Factor Reversal Test for data given below.

Commodities	Price		Quandity	
	2003	2009	2003	2009
Rice	10	13	4	6
Wheat	125	18	7	8
Rent	25	29	5	9
Fuel	11	14	8	10
Miscellaneous	14	17	6	7

108) Calculate Fisher's price index number and show that it satisfies both Time Reversal Test and Factor Reversal Test for data given below.

Commodities	Base Year		Current Year	
	Price	Quantity	Price	Quantity
Rice	10	5	11	6
Wheat	12	6	13	4
Rent	14	8	15	7
Fuel	16	9	17	8
Transport	18	7	19	5
Miscellaneous	20	4	21	3

109) Construct Fisher's price index number and prove that it satisfies both Time Reversal Test and Factor Reversal Test for data following data.

Commodities	Base Year		Current Year	
	Price	Quantity	Price	Quantity
Rice	40	5	48	4
Wheat	45	2	42	3
Rent	90	4	95	6
Fuel	85	3	80	2
Transport	50	5	65	8
Miscellaneous	65	1	72	3

110) Calculate the cost of living index number for the following data.

Commodities	Quantity 2005	Price	
		2005	2010
A	10	7	9

B	12	6	8
C	17	10	15
D	19	14	16
E	15	12	17

111) Calculate the cost of living index number for the year 2015 with respect to base year 2010 of the following data.

Commodities	Number of Units (2010)	Price (2010)	Price (2015)
Rice	5	1500	1750
Sugar	3.5	1100	1200
Pulses	3	800	950
Cloth	2	1200	1550
Ghee	0.75	550	700
Rent	12	2500	3000
Fuel	8	750	600
Misc	10	3200	3500

112) Calculate the cost of living index number by consumer price index number for the year 2016 with respect to base year 2011 of the following data

Commo-dities	Price Base year	Current year	Quantity
Rice	32	48	25
Sugar	25	42	10
Oil	54	85	6
Coffee	250	460	1
Tea	175	275	2

113) Construct the cost of living index number for 2011 on the basis of 2007 from the given data using family budget method.

Commodities	Price		Weights
	2007	2011	
A	350	400	40
B	175	250	35
C	100	115	15
D	75	105	20
E	60	80	25

114) The following data gives the readings for 8 samples of size 6 each in the production of a certain product. Find the control limits using mean chart.

Sample	1	2	3	4	5	6
Mean	300	342	351	319	326	333
Range	25	37	20	28	30	22

Given for n = 6, A_2 = 0.483,

115) The data shows the sample mean and range for 10 samples for size 5 each. Find the control limits for mean chart and range chart.

Sample	1	2	3	4	5	6	7	8	9	10
Mean	21	26	23	18	19	15	14	20	16	10

Range	5	6	9	7	4	6	8	9	4	7

116) Compute the average seasonal movement for the following series

Year	Quarterly Production			
	I	II	III	IV
2002	3.5	3.8	3.7	3.5
2003	3.6	4.2	3.4	4.1
2004	3.4	3.9	3.7	4.2
2005	4.2	4.5	3.8	4.4
2006	3.9	4.4	4.2	4.6

117) The annual production of a commodity is given as follows :

Year	Production (in tones)
1995	155
1996	162
1997	171
1998	182
1999	158
2000	180
2001	178

Fit a straight line trend by the method of least squares.

118) Determine the equation of a straight line which best fits the following data

Year	2000	2001	2002	2003	2004
Sales(Rs.'000)	35	36	79	80	40

Compute the trend values for all years from 2000 to 2004

119) The sales of a commodity in tones varied from January 2010 to December 2010 as follows:

In year 2010	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sales (in tones)	280	240	270	300	280	290	210	200	230	200	230	210

Fit a trend line by the method of semi-average.

120) Use the method of monthly averages to find the monthly indices for the following data of production of a commodity for the years 2002, 2003 and 2004.

2002	15	18	17	19	16	20	21	18	17	15	14	18
2003	20	18	16	13	12	15	22	16	18	20	17	15
2004	18	25	21	11	14	16	19	20	17	16	18	20

121) Calculate the seasonal indices from the following data using the average from the following data using the average method:

	I Quarter	II Quarter	III Quarter	IV Quarter
2008	72	68	62	76
2009	78	74	78	72
2010	74	70	72	76
2011	76	74	74	72
2012	72	72	76	68

122) The following table shows the number of salesmen working for a certain concern:

Year	1992	1993	1994	1995	1996
No. of salesmen	46	48	42	56	52

Use the method of least squares to fit a straight line and estimate the number of salesmen in 1997.

123) Calculate price index number for 2005 by (a) Laspeyre's (b) Paasche's method

Commodity	1995		2005	
	Price	Quantity	Price	Quantity
A	5	60	15	70
B	4	20	8	35
C	3	15	6	20

124) Compute
(i) Laspeyre's
(ii) Paasche's
(iii) Fisher's Index numbers for the 2010 from the following data.

Commodity	Price		Quantity	
	2000	2010	2000	2010
A	12	14	18	16
B	15	16	20	15
C	14	15	24	20
D	12	12	29	23

125) Using the following data, construct Fisher's Ideal index and show how it satisfies Factor Reversal Test and Time Reversal Test?

Commodity	Price in Rupees per unit		Number of units	
	Base year	Current year	Base year	Current year
A	6	10	50	56
B	2	2	100	120
C	4	6	60	60
D	10	12	50	24
E	8	12	40	36

126) Using Fisher's Ideal Formula, compute price index number for 1999 with 1996 as base year, given the following:

Year	Commodity: A		Commodity: B		Commodity: C	
	Price (Rs.)	Quantity (Kg)	Price (Rs.)	Quantity (Kg)	Price (Rs.)	Quantity (Kg)
1996	5	10	8	6	6	3
1999	4	12	7	7	5	4

127) Calculate Fisher's index number to the following data. Also show that it satisfies Time Reversal Test.

Commodity	Price in Rupees per unit		Number of units	
	Price (Rs.)	Quantity (Kg)	Price (Rs.)	Quantity (Kg)
Food	40	12	65	14
Fuel	72	14	78	20
Clothing	36	10	36	15
Wheat	20	6	42	4
Others	46	8	52	6

128) The following are the group index numbers and the group weights of an average working class family's budget. Construct the cost of living index number:

Groups	Food	Fuel and Lighting	Clothing	Rent	Miscellaneous
Index Number	2450	1240	3250	3750	4190
Weight	48	20	12	15	10

129) Construct the cost of living Index number for 2015 on the basis of 2012 from the following data using family budget method.

Commodity	Price		Weight
	2012	2015	

Rice	250	280	10
Wheat	70	280	5
Corn	150	170	6
Oil	25	35	4
Dhal	85	90	3

130) Calculate the cost of living index by aggregate expenditure method:

Commodity	Weights 2010	Price (Rs.)	
		2010	2015
P	80	22	25
Q	30	30	45
R	25	42	50
S	40	25	35
T	50	36	52

131) The following data show the values of sample means and the ranges for ten samples of size 4 each. Construct the control chart for mean and range chart and determine whether the process is in control

Sample number	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	29	26	37	34	14	45	39	20	34	23
R	39	10	39	17	12	20	05	21	23	15

132) In a production process, eight samples of size 4 are collected and their means and ranges are given below. Construct mean chart and range chart with control limits.

Sample number	1	2	3	4	5	6	7	8
$\bar{X}$	12	13	11	12	14	13	16	15
R	2	5	4	2	3	2	4	3

133) In a certain bottling industry the quality control inspector recorded the weight of each of the 5 bottles selected at random during each hour of four hours in the morning.

Time	Weights in ml				
8:00 AM	43	41	42	43	41
9:00 AM	40	39	40	39	44
10:00 AM	42	42	43	38	40
11:00 AM	39	43	40	39	42

134) Fit a straight line trend by the method of least squares to the following data.

Year	1980	1981	1982	1983	1984	1985	1986	1987
Sales	50.3	52.7	49.3	57.3	56.8	60.7	62.1	58.7

135) Calculate the Laspeyre's, Paasche's and Fisher's price index number for the following data. Interpret on the data.

Commodities	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	170	562	72	632
B	192	535	70	756
C	195	639	95	926
D	187	128	92	255
E	185	542	92	632
F	**150**	**217**	**180**	**314**
7	12.6	12.7	12.5	12.8
8	12.4	12.3	12.6	12.5
9	12.6	12.5	12.3	12.6
10	12.1	12.7	12.5	12.8

136) Using the following data, construct Fisher's Ideal Index Number and Show that it satisfies Factor Reversal Test and Time Reversal Test?

Commodities	Price		Quantity	
	Base Year	Current year	Base Year	Current year
Wheat	6	10	50	56
Ghee	2	2	100	120
Firewood	4	6	60	60
Sugar	10	12	30	24
Cloth	8	12	40	36

137) From the following data, calculate the control limits for the mean and range chart.

Sample No.	1	2	3	4	5	6	7	8	9	10
Sample Observations	50	51	50	48	46	55	45	50	47	56
	55	50	53	53	50	51	48	56	53	53
	52	53	48	50	44	56	53	54	49	55
	49	50	52	51	48	47	48	53	52	54
	54	46	47	53	47	51	51	57	54	52

138) The following data gives the average life(in hours) and range of 12 samples of 5 lamps each. The data are

Sample No	1	2	3	4	5	6
Sample Mean	1080	1390	1460	1380	1230	1370
Sample Range	410	670	180	320	690	450
Sample No	7	8	9	10	11	12
Sample Mean	1310	1630	1580	1510	1270	1200
Sample Range	380	350	270	660	440	310

Construct control charts for mean and range. Comment on the control limits.

139) The following are the sample means and ranges for 10 samples, each of size 5. Calculate the control limits for the mean chart and range chart and state whether the process is in control or not.

Sample number	1	2	3	4	5	6	7	8	9	10
Mean	5.10	4.98	5.02	4.96	4.96	5.04	4.94	4.92	4.92	4.98
Range	0.3	0.4	0.2	0.4	0.1	0.1	0.8	0.5	0.3	0.5

140) Fit a straight line trend to the following data using the method of least square. Estimate the trend for 2007.

year	2000	2001	2002	2003	2004
Sales (in tonnes)	1	1.8	3.3	4.5	6.3

141) From the data given below, calculate seasonal indices.

Quarter	Year				
	1984	1985	1986	1987	1988
I	40	42	41	45	44
II	35	37	35	36	38
III	38	39	38	36	38
IV	40	38	40	41	42

142) Compute (i) Laspeyre's (ii) Paasche's (iii) Fisher's price index number for 2000 from the following data.

Commodity	Price		Quantity	
	1990	2000	1990	2000

A	2	4	8	6
B	5	6	10	5
C	4	5	14	10
D	2	2	19	13

143) Calculate Fisher's ideal index from the following data and verify that it satisfies both time reversal and factor reversal test

Commodity	Price		Quantity	
	1985	1986	1985	1986
A	8	20	50	60
B	2	6	15	10
C	1	2	20	25
D	2	5	10	8
E	1	5	40	30