Statistical Data and Descriptive Statistics

1. A cyclist covers first 30 km at an average speed of 80 km/hr, another 20 km at 30 km/hr and the last 20 km at 20 km/hr. Find the average speed for the entire journey and verify your answer.

2. A cyclist covers successive quarters of a mile at the speed of 12, 10, 8 and 7 km/hr respectively. Find the average speed.

3. A train runs 25 km at an average speed of 30 km/hr, another 50 km at a speed of 40 km/hr, then due to repair of the track travels for 6 minutes at a speed of 10 km/hr and finally covers the remaining distance of 24 km at a speed of 24 km/hr. What is the average speed in km/hr?

4. A man starts from rest and travels successive quarters of miles at an average speeds of 12, 16, 24 and 48 kms per hour. The average speed over the whole distance is 19.2 km/hr. and not 25 km./hr. Explain and show how you can verify the arithmetic.

5. Four persons Al B, C and D are working in a factory. A produces a unit of production in 12 minutes, B in 16 minutes, C in 24 and D in 48 minutes. Find the average rate of working. What is the average number of units completed per minute. At this rate how many units will they complete in 6 hours a day.

6. The interest paid on each of the three different sums of money yielding 10%, 12% and 15% simple interest p.a. is the same. What is the average yield per cent on the sum invested?

7. A man having to drive 90 km wishes to achieve an average speed of 30 km per hour. For the first half of the journey, he averages only 20 km per hour. What must be his average speed for the second half of the journey if his overall average speed is to be 30 km per hour?

8. A man buys mangoes from one shop at the rate of Rs. 20 per kg, from the second shop at the rate of Rs. 25 per kg, from the third shop at the of Rs. 30 per kg and from the fourth shop at the rate of Rs. 35 per kg. Find the average rate in rupees per kg if he buys mangoes of Rs. 10 from each shop.

9. A person buys kerosene at Rs. 0.80, Rs. 1.20, Rs. 1.80 and Rs. 2.80 per litre for four successive years. What was the average cost of oil when he spends Rs. 1000 each year and when he buys 1,000 litres every year?

10. What is meant by central tendency? State important measures of central tendency.

11. What is a statistical average? What are the properties of an ideal average?

12. Explain the relative merits and demerits of arithmetic mean, median and mode as measures of central tendency.

Or

Define arithmetic mean, median and mode and discuss their relative merits and demerits.

13. Discuss in brief merits and demerits of various measures of central tendency.

14. Give different measures of central tendency with their formulae. Also state the situations where these measures can be used.

15. Give relationship between A.M., G.M. and H.M.

16. Give the empirical relationship between $\bar{X}$, M and Z for a perfectly symmetrical distribution and a moderately skewed distribution.

17. What are the essentials of a good average?

Or

What are the characteristics of a good measure of central tendency?

18. Explain the mathematical properties of Arithmetic Mean. What is the relationship among Mean, Median and Mode?

19. What are the desirable properties of an average? Which of the average you know possess most of them?

Probability and Probability Distributions

1. Batsman X and Y scored following runs in different innings they played in a test series. Which of the two is a better score? Who is more consistent batsman?

X:	12	115	6	73	7	19	119	36	84	29
Y:	47	12	76	42	4	51	37	48	13	0

2. The following is the record number of bricks laid each day for 10 days by two layers A and B. Calculate the coefficient in each case and discuss the relative consistency of the two brick-layers.

A:	700	675	725	625	650	700	650	700	600	650
B:	550	600	575	550	650	600	550	525	625	600

If each of the values in respect of worker A is decreased by 10 and each of the values for worker B is increased by 50, how will it affect the results obtained earlier?

3. Goals scored by two teams A and B in a football session were as follows:-

No. of goals scored	0	1	2	3	4	5
No. of matches by A:	15	10	7	5	3	2
No. of matches by B:	20	10	5	4	2	1

Find out which team is more consistent.

4. If 20 is a subtracted from every observation in a data set, then the coefficient of variation of the resulting set is 20%. If 40 is added to every observation of the same data, then the coefficient of variation of the resulting set of data is 10%. Find the $\bar{X}$ and σ of the original set of data.

5. The coefficient of variation of wages of male workers and female workers are 55 percent and 70 percent respectively, while the standard deviations are 22.0 and 15.4 respectively. Calculate the overall average wages of all workers given that 80 percent of the workers are male.

6. What is meant by dispersion? What purpose does a measure of dispersion serve?

7. What are the various measures of dispersion. Explain the relative merits and demerits of each.

8. (i) What are the properties of a good measure of variation?
   (ii) Why is standard deviation considered a better measure of dispersion.

9. What is coefficient of variation? What purpose does it serve? Also distinguish between variance and coefficient of variation.

10. Define range, interquartile range, quartile deviation, mean deviation and standard deviation. Describe their merits and demerits.

11. Define dispersion. Discuss the merits and demerits of different measures of dispersion.

12. What do you understand by standard deviation? Explain its important properties.

13. Explain the method of measuring inequalities of income by using Lorenz curve.

14. What do you understand by Lornez curve? Discuss the usefulness of Lornez curve.

15. Why is S.D. (σ) the most widely used measure of dispersion? Explain.

16. If a constant is subtracted from each score in a series, what will be its effect on $\bar{X}$ and σ?

Simple Correlation and Regression Analysis

1. Calculate the Correlation from the following data of marks obtained in Commerce (X) and Economics (Y):

X:	50	60	58	47	49	33	65	43	46	68
Y:	48	65	50	48	55	58	63	48	50	70

2. Seven students obtained the following percentage of marks in the college test (X) and in the final examination (Y). Find out the coefficient of correlation between these variables.

X:	50	62	72	25	20	60	60
Y:	48	65	74	33	25	55	66

3. Calculate Karl Pearson's coefficient of correlation between the values of X and Y for the following data:

X:	78	89	96	69	59	79	68	61
Y:	125	137	156	112	107	136	123	108

Assume 69 and 112 as the mean values for X and Y respectively.

4. The following table gives the distribution of items of production and also the relative defective items among them, according to size groups. Find the correlation coefficient between size and defect in quality.

Size group:	15-16	16-17	17-18	18-19	19-20	20-21
No. of items:	200	270	340	360	400	300
No. of defective items:	150	162	170	180	180	114

5. Find out coefficient of correlation from the following data:

X:	300	350	400	450	500	5550	600	650	700
Y:	800	900	1000	1100	1200	1300	1400	1500	1600

[Hint: Let $dx = \frac{X-500}{50}$, $dy = \frac{Y-1200}{100}$]

6. Calculate the coefficient of correlation between age group and mortality rate from the following data:

Age group:	0-20	20-40	40-60	60-80	80-100
Rate of mortality	350	280	540	760	900

7. Calculate Karl Pearson's coefficient of correlation between age and playing habits from the data given below:

Age:	16	17	18	19	20	21	22
No. of students	350	320	280	240	180	120	50
Regular players:	315	256	182	132	63	18	4

8. Following figures give the rainfall in inches and production in' 00 tons for Rabi and Kharif crops for number of years. Find the coefficient of correlation between rainfall and total production.

Rainfall:	20	22	24	26	28	30	32
Rabi production:	15	18	20	32	40	39	40
Kharif production:	15	17	20	18	20	21	15

9. Define correlation. Explain the various methods of studying correlation. What is the significance of studying correlation?

10. What is correlation? Explain various types of correlation. Does it always signif cause and effect relationship between the two variables?

11. Define Pearsons' coefficient of correlation. Interpret r when $r = 1$, -1 and 0.

12. Define rank correlation coefficient. How is it measured? When is it preferred to Karl Pearson's coefficient of correlation.

13. What is meant by coefficient of concurrent deviation? How is it measured?

14. What is scatter diagram and how is it useful in the study of correlation?

15. Explain the followings:

    (i) Portable Error, (ii) Coefficient of Determination.

16. Explain the properties of correlation coefficient.

(Unit- 4)

Index Numbers

1. The cost of living index uses the following weights: Food 40, Rent 15, Clothing 20, Fuel 10, Miscellaneous 15. During the period 2000-05, the cost of living index raised from 100 to 205.72. Over the same period the percentage rises in prices were:
   Rent-60, Clothing-180, Fuel-75, Miscellaneous-165. What is the percentage change in the price of food ?
   [Hint $\frac{40x+7725}{100} = 105.72$]

2. An enquiry into the budget of the middle class families in Bombay gave the following information:

Expenses:	Food 35%	Rent 15%	Clothing 20%	Fuel 10%	Misc 20%
Price in 2004 (Rs):	150	50	100	20	60
Price in 2005 (Rs):	174	60	125	25	90

   What changes in the cost of living figures in 2005 have taken place as compared to 2004?

3. In calculation, a certain cost of living index number, the following weights were used: Food 15, clothing 3, rent 4, fuel and light 2, misellaneous 1. Calculate the index for a data when the average percentage increases in price of items in the various groups over the base period were 32, 54, 47, 78 and 58 respectively.
   Suppose a business executive was earning 22000 in the base period, what should be his salary in the current period if his standard of living is to remain the same?

4. An enquiry into the budgets of the middle class families in a certain city revealed that on an average the percentage expenses of different groups were: Food 45; Rent 15; Clothing 12; Fuel and Light 8 and Miscellaneous 20. The group index numbers for the current year as compared with a fixed base period were respectively 410, 150, 343, 248 and 285. Calculate the cost of living index for the current year. Suppose Mr. X was getting 2240 in the base allowance and 2430 in the current year. State how much he ought to have received as extra ll owance to maintain his former standard of living?

5. In 2003 for working class people wheat was selling at an average price of Rs. 32 per 10 kg, cloth at Rs. 4 per metre. house rent Rs. 60 per house and other items at Rs. 20 per unit. By 2004 cost of wheat rose by Rs. 8 per 10 kg, house rent by Rs. 30 per house and other items doubled in Price. The working class cost of living index for the year 2004 (with 2003 as base) was 160. B how much the cloth rose in during the period?

6. Distinguish between fixed base and chain base methods of constructing index number and give their relative merits.

7. Write a short note on 'Chain Base Index'.

8. Explain the following terms: (i) Base Shifting (ii) Splicing and (iii) Deflating.

9. What is the cost of living index number? Discuss its uses. Give formulae you will use in the construction of cost of living index.

10. Discuss the uses and construction of Consumer Price Index.

11. Using suitable examples, explain the operations of base shifting, splicing and deflating in the context of index numbers.

12. What is a seasonal Index?

13. What is moving average method?

14. What is semi-average method?

15. Explain link relatives method?

16. What are the objectives of studying seasonal variations?

17. Define deseasonalisation of data?

18. Write any three steps involved in ratio to moving average method.

Time Series Analysis

1. What is a seasonal index?
2. What is moving average method?
3. What is semi-average method?
4. Explain link relatives method.
5. What are the objectives of studying seasonal variations?
6. Define deseasonalisation of data.
7. Write any three steps involved in ratio to moving average method.
8. Write the normal equation to determine the value of a and b in the trend equation $Y = a + bX$, given the n observations.
9. You are given the following trend equation: $Y = 45 + 5X$ (origin =1990, X unit =1 year) shift the origin to (i) 1988 & (ii) 1993.
10. With what characteristic component of a time series should each of the following be associated?
    (i) A fire in a factory delaying production for three weeks.
    (ii) Arena of prosperity.
    (iii) Sales of a textile firm during Deepawali.

11. What is a seasonal index? Explain the different methods of estimating it.
12. Discuss the ratio-to moving average and the ratio-to trend method of measuring seasonal variations. Compare the two methods.
13. Explain any method of estimating the seasonal index for a time series based on quarterly data.
14. Describe, step by step, the moving average method of determining seasonal index.
15. Explain briefly the various methods of isolating seasonal fluctuations in time series.
16. What are seasonal variations? How would you construct a seasonal index using ratio to trend method? What are the uses and limitations of seasonal indices.
17. Calculate the seasonal index for following data by using simple average method assuming trend is absent:

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1987	3.7	4.1	3.3	3.5
1988	3.7	3.9	3.6	3.6
1989	4.0	4.1	3.3	3.1
1990	3.3	4.4	4.0	4.0

18. Calculate the seasonal index for the following data by using simple average method for the following data:

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1981	112	110	120	115
1982	80	145	105	90
1983	95	100	140	80
1984	110	90	130	100