Q.1 Calculate the arithmetic mean, the Median and the Mode for the following data regarding tips given by customers to a waiter in a day.

Amount in Rs.	10-20	20-30	30-40	40-50	50-60
No. of persons	50	150	175	100	25

Q.2 Calculate arithmetic mean, median and mode for the following data:

Class interval	100-149	150-199	200-249	250-299	300-349
Frequency	15	18	14	20	17

6. Calculate combined mean of the two groups for the following data & hence check which group is more consistent.

	Group I	Group II
Number	100	200
Mean	50	45
S.D	5	3

7. Calculate standard deviation for the following data. Also find its coefficient of variation.

Marks	30-40	40-50	50-60	60-70	70-80	80-90
No. of students	3	15	27	15	8	2

8. Calculate quartile deviation and its coefficient for the following data:

Class interval	Below 5	5-10	10-15	15-20	20 and above
Frequency	6	9	20	18	9

Q.1 Find raw moments for the following data:

i) 5, 8, 12, 4, 6.

ii)

X	-1	0	1	2	3	4
F	2	4	3	7	3	1

iii)

Class Interval	0-10	10-20	20-30	30-40	40-50
Frequency	1	2	9	2	6

Q.7 Find the Bowley's coefficient of Skewness for the following distribution:

i) 17, 35, 28, 46, 85, 93, 56, 67, 22,12

ii)

C.I	5-10	10-15	15-20	20-25	25-30
f	3	4	7	4	2

Q) write the process of sampling

PROCESS OF SAMPLING

In this part of the chapter, we will discuss a few details regarding the process of sampling. So the steps are mentioned in the steps below:

- The first step is a wise choice of the population set.
- The second step is focusing on the sample set and the size of it.
- Then, one needs to choose an identifiable property based on which the samples will be created out of the population set.
- Then, the samples can be chosen using any of the types of sampling theory – Simple random, systematic, or stratified. Each of them is thoroughly discussed in the article ahead.
- Checking the inaccuracy, if there is any.
- Hence, the set is achieved in the result.

Sampling can be done in their different method and they are given below:

1. Simple random type.
2. Systematic Sampling.
3. Stratified sampling.

Q) property of good estimates

Estimate: A particular value of an estimator corresponding to the given sample values is called an estimate of the population parameter.

Requirements of good and reliable estimators:

1. Unbiasedness: An estimator is called unbiased if it is expected to draw. Such a value from the sample which is equal to the population parameter being estimated.

2. Consistency: An estimator with smaller variance is called efficient.

3. Efficiency : An estimator is said to be consistent if its expected value gets closer and closer to the parameter being estimated as the sample size increases.

4. Sufficiency: An estimator is said to be sufficient, if it conveys all information the sample can furnish for the estimation of the parameter being estimated.

Standard Error :

In sampling we are considering measure for both population and sample at the same time. The standard deviation of the statistic is termed as S*tandard Error* (SE) just to differentiate it from the standard deviation of the population. Also, we know that the statistic value changes from sample to sample. So the sampling distribution measures these deviations, say of the sample means from the mean of all samples. Such an error is called *sampling error* or *standard error*. Students should remember that SE is nothing but the standard deviation of the sample taken for investigation.

Central limit Theorem :

This is a very important theorem in sampling distribution theory. In practice not all population show a normal distribution. The *Central limit theorem* state that "When a random sample is drawn from a population which is not normally distributed then as the sample size is increased, the standard deviation of the sample mean is approximately normally distributed with mean equal to the mean of the population and standard deviation equal to $\sigma/\sqrt{n}$, where σ is the standard deviation of the population".

If the size of the sample is more than 30 it is said to be large, in general.

Q)write the property of chi square

The χ^2 distribution follow the following properties:

1. The whole χ^2 distribution curve lies in the first quadrant since the range of χ^2 is from 0 to ∞.
2. The χ^2 distribution has only one parameter k, the degree of freedom for χ^2. Thus, the shape of the probability density curve mainly depends on the parameter k.
3. χ^2 distribution curve is highly positive skewed.
4. It is an unimodal curve and its Mode is at the point $\chi^2 = (k - 1)$.
5. The shape of the curve varies immensely especially when k is small. For k =1 and k = 2, it is just like a hyperbola.
6. χ^2 distribution is completely defined by one parameter 'k', which is known as the degree of freedom for χ^2 distribution.
7. The constants for χ^2 distributions are as follows:
   Mean = $\mu = k$
   Variance = $\sigma^2 = 2k$
   Skewness = $\alpha_1 = 2\left(\frac{2}{k}\right)^{\frac{1}{2}}$
8. The movement generating function for χ^2 distribution is
$$\emptyset_{\chi^2}(t) = (1 - 2t)^{\frac{-k}{2}}.$$
9. r^{th} raw moment of χ^2 distribution is $\mu'_r = \frac{2\Gamma\left(\frac{k}{2}+r\right)}{\frac{\Gamma k}{2}}$.
10. For large degrees of freedom say $k \geq 100$, the variable is distributed normally with mean 0 and variance 1.

Q.5 The probability distribution of daily demand of cell phones in a mobile gallery is given below. Find the mean and variance.

Demand	5	10	15	20
Probability	0.4	0.2	0.3	0.1

Q.2 A random simple of 100 bundles gives a mean of 8.5 ton.& standard deviation 4 tons. Can the sample be regarded as drawn from a population with mean 7 tons? test this at 5% level of significance.

Q.4 The average income of 100 men in a city is Rs.15,000 with standard deviation Rs.8500 and the average income of 100 women is Rs.12,000 and standard deviation is Rs.9000. can it be said at 5% level of confidence that there is a significant difference between the average income of men and women?

Q.7 A manufacturer claims that 10% of his product is defective. A sample of 300 items selected at random had 32 defective items. Test his claim at 1% level of significance. (At 1% level of significance the value of 2.58)

Q.3 Among 64 offspring's of a certain cross between guinea pigs, 34 were red, 10 were black and 20 were white. According to the genetic model, these numbers should be in the ratio 9:3:4, are the data consistent with the model at the 5% level?

Q.2 Ten individuals are chosen at random from a population and their heights are found to be in inches 63, 63, 64, 65, 66, 69, 69, 70, 70, 71.

Q.5 The mean weakly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful?

Q.1 From the following data, calculate Karl Person's correlation coefficient.

X	18	15	17	16	12	14	19	20
Y	15	16	14	17	15	11	18	19

Q.2 Calculate product moment correlation coefficient between advertising expenditure (in '1000) and annual sales (in '1000) given below:

Advt Expenses	3	7	4	2	1	4	1	2
Sales	11	16	9	4	7	6	3	8

Q.6 Fit linear regression equation for the following data:

X	1	2	3	4	5
Y	14	27	40	55	68

Q.9 Fit second degree curve of regression for the following data:

X	1	2	3	4
Y	6	11	18	27

Q.14 Obtain an equation of trend for the following data and hence estimate sales in 2006.

Years	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Sales '000	88	96	75	94	164	195