(c) Case of a continuous variable

(i) Histogram :- It is an appropriate diagram for representing the frequency distribution of a continuous variable in the sense that it considers the fact that the frequency of class is dispersed over the interval. Here two coordinates axes are taken and the class-boundaries are shown on the horizontal axis for locating the class intervals. Next, a rectangle is drawn over each class interval so that its area indicates the corresponding class frequency. In other words, the height of the rectangle becomes equal to the corresponding frequency density. In this manner, a series of adjoining rectangles are erected so that the area covered by this entire group of rectangles exhibits the total frequency. The diagram so formed is called the histogram of the frequency distribution. It should be noted that the widths of the rectangles, which are same as class widths, are not necessarily equal.

A histogram is used, as we shall see later, for finding mode of frequency distribution or number of observations above or below a specified variate value. It also gives a rough idea about

the shape of the frequency curve

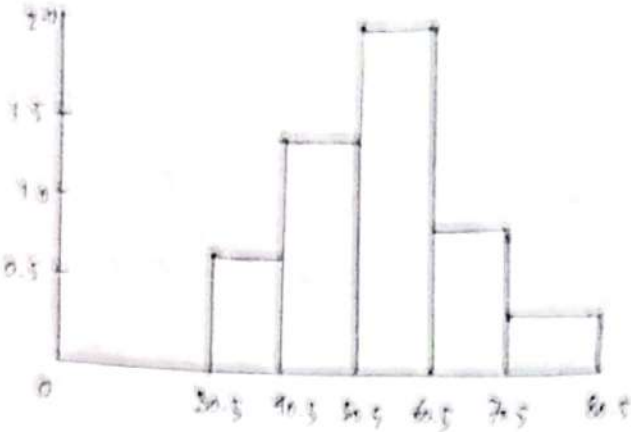

Figure 2.3 Histogram for the frequency distribution of marks (Table 2.7)

2.8 Frequency Curve

One of the diagrammatic representation of frequency distribution of a continuous variable is a histogram. In this diagram we take the variable values along the horizontal axis and frequency density along the vertical axis and the area under the histogram becomes the total frequency. Now, suppose the total frequency is gradually increased and width of each class is gradually decreased (so that the total number of classes gradually increase) Then the histogram will gradually approach a smooth curve. Frequency curve is the limiting form of the histogram. (with relative frequency densities, instead of frequency densities along vertical axis) when total frequency tends to infinity and at the same time width of the classes tends to zero. The area under the curve will be unity.

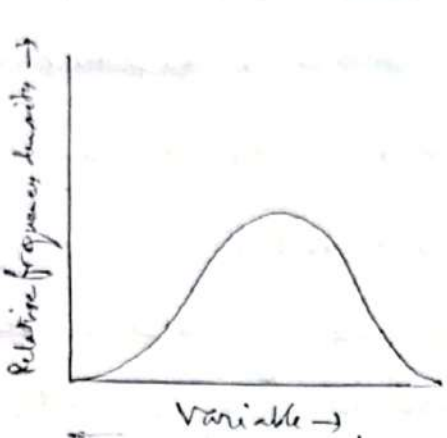

Fig 2.4 Bell-shaped frequency curve

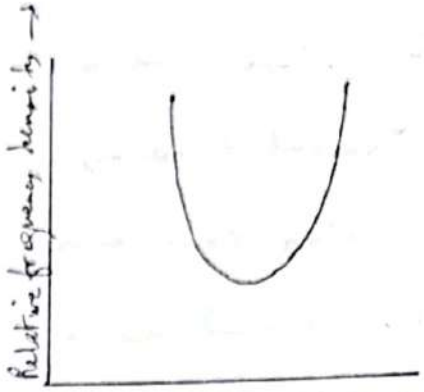

Fig 2.5 U-shaped frequency curve

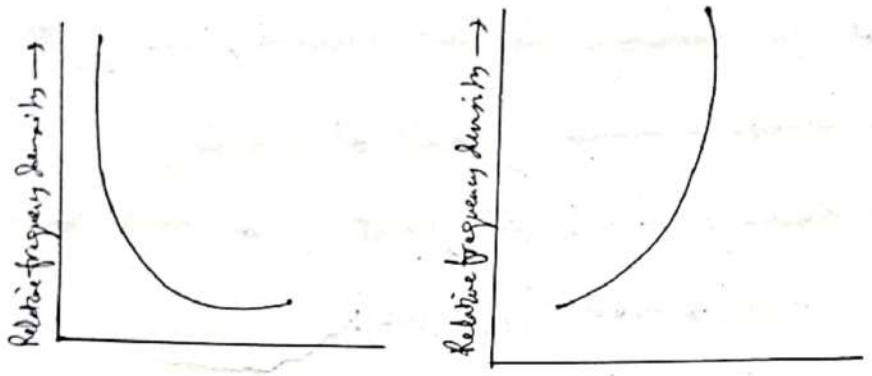

Fig 2.6 J-shaped frequency curves

3. MEASURES OF CENTRAL TENDENCY

3.1 Meaning of central tendency

If we look at the frequency distribution which we come across in practice, we shall find that there is usually a tendency of the variate values to cluster around a central value; in other words, most of the values lie in a small interval about a central value. This characteristic is called the central tendency of a frequency distribution.

The central value, which is taken as a representation of the entire data, is called a measure of the central tendency or, simply an average.

In relation to a frequency distribution, an average is also termed as a measure of location, because it helps to locate the position of the distribution on the axis of the variable. It may be noted that an average is not necessarily one of the given values.

3-2 Common measures of central tendency

An average is of different form and among them the commonly used types are;

(i) Arithmetic mean (or simply mean),

(ii) Median, and

(iii) Mode.

(i) Arithmetic mean : The arithmetic mean of a variable is derived by dividing the sum of its values ~~$x_1, x_2, \ldots, x_n$~~ by the number of values. If x denotes the variable under consideration and its values, namely, $x_1, x_2, \ldots, x_n$ are given, then the arithmetic mean of x, denoted by $\bar{x}$, is given by

$$\bar{x} = \frac{x_1 + x_2 + \cdots + x_n}{n} = \frac{1}{n} \sum_{i=1}^{n} x_i \quad \ldots (2a)$$