Moments, Skewness and kurtosis:

Measure of skewness:

i) **Pearson's 1st measure of skewness:**

$$Skewness = \frac{mean - mode}{Standard\ deviation}$$

ii) **Pearson's 2nd measure of skewness:**

$$Skewness = \frac{3(mean - median)}{Standard\ deviation}$$

iii) **Skewness based on moments:**

$$skewness, \sqrt{\beta_1} = \frac{\mu_3}{\sqrt{{\mu_2}^3}}$$

$$= \frac{3rd\ central\ moment}{\sqrt{(2nd\ central\ moment)^3}}$$

$$\mu_3 = \frac{\sum_{i=1}^{n} f_i (x_i - \overline{x})^3}{N}$$

$$\mu_2 = \frac{\sum_{i=1}^{n} f_i (x_i - \overline{x})^2}{N}$$

Kurtosis:

i) **Platykurtic distribution: flat topped ($\beta_2 < 3$)**
ii) **Leptokurtic distribution: highly peaked ($\beta_2 > 3$)**
iii) **Mesokurtic distribution: neither peaked nor flat ($\beta_2 = 3$)**

Karl Pearson's measure of kurtosis:

$$\beta_2 = \frac{\mu_4}{{\mu_2}^2} = \frac{4th\ central\ moment}{(2nd\ central\ moment)^2}$$

$$\mu_2 = \frac{\sum_{i=1}^{n} f_i (x_i - \overline{x})^2}{N}$$

$$\mu_4 = \frac{\sum_{i=1}^{n} f_i (x_i - \overline{x})^4}{N}$$

	[CO1]