ing the Newton-Gregory forward difference interpolating polynomial. Consequently, all the rules were based on evenly faced sampling points (function values) within the range of integral.

Gauss integration is based on the concept that the accuracy of numerical integration can be improved by choosing the sampling points wisely, rather than on the basis of equal spacing. For example, consider a simple trapezoidal rule as shown in Fig. 12.6(a). Here, the end points of the integral lie on the function curve. Now, consider Fig. 12.6(b). Here, the straight line has been moved up such that area $B = A + C$. Notice that the sampling points are moved away from the end points. The function values at the end points are not used in computation. Rather, function values $f(x_1)$ and $f(x_2)$ are used to compute the shaded area. It is clear that the area obtained from Fig. 12.6(b) would be much closer to the actual area compared to the shaded area in Fig. 12.6(a). The problem is to compute the values of x_1 and x_2 given the values a and b and to choose appropriate "weights" w_1 and w_2. The method of implementing the strategy of finding appropriate values of x_i and w_i and obtaining the integral of $f(x)$ is called the *Gaussian integration* or *quadrature*.

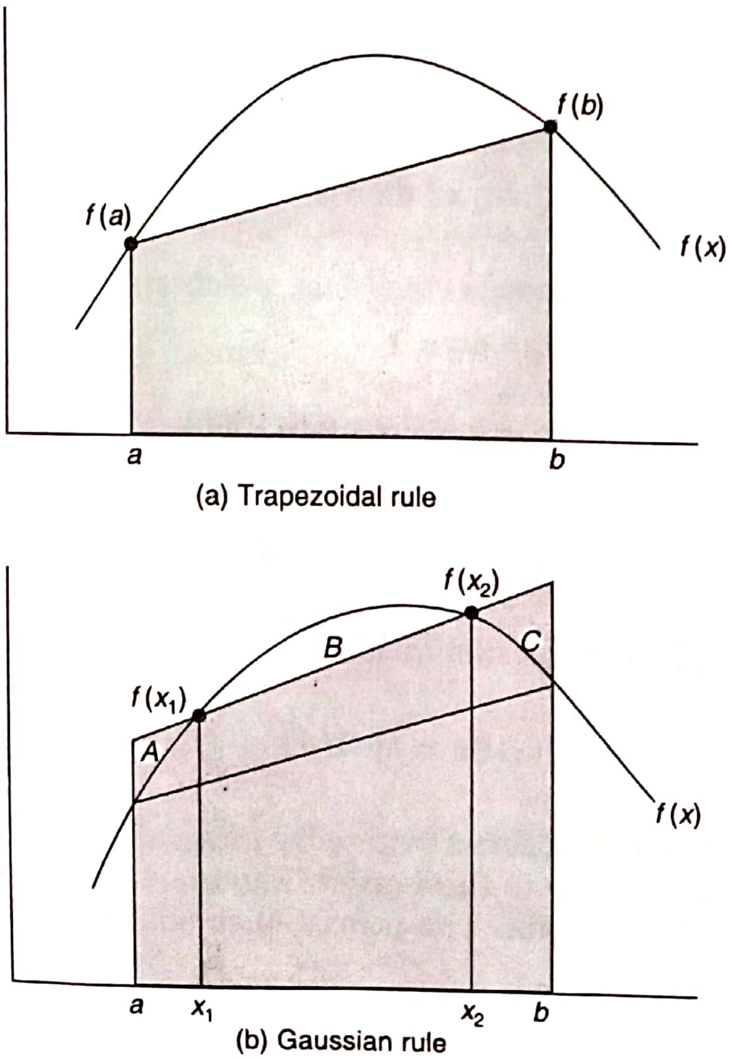

Fig. 12.6 Gaussian integration