



Unit - IV - Initial Value Problems for Ordinary  
Differential Equations:

(i) Single step Methods (or) Pointwise Methods:

A series for  $y$  in terms of powers of  $x$ , from which the value of  $y$  can be obtained by direct substitution. The methods of Taylor and Picard belong to this type. In these methods  $y$  is approximated by a truncated series and each term of the series is a function of  $x$ . The information about the curve at one point is used and the solution is not iterated. Hence these methods are called single step methods.

(ii) MultiStep Methods (or) Step by step Methods

In a set of tabulated values of  $x$  and  $y$ , we obtain  $y$  by iterative process. The methods of Euler, Runge-Kutta, Milne, Adams, Bashforth etc, belong to this type. Here the values of  $y$  are computed by short steps for equal intervals  $h$  of the independent variable. These values are iterated till we get the desired accuracy. Hence these methods are called step by step methods.