DC motors are widely used in industrial application for its different advantage such us high efficiency, low costs and flexibilities. For controlling the speed of DC motor, conventional controller PI and PID were the most widely used controllers. But due to empirically selected parameters K_p,K_i,K_d and limitation of convention PID controller to achieve ideal control effect for higher order systems, a Fractional order Proportional-Integral-Derivative PID (FOPID) based on optimization techniques was proposed in this paper. The aim of this paper is to study the tuning of a FOPID controller using intelligent soft computing techniques such as Differential Evolution (DE) and Particle Swarm Optimization (PSO) for designing fractional order PID controller. The parameters of FOPID controller are determined by minimizing the Integral Time Absolute Error (ITAE) between the output of reference model and the plant. The performance of DE and PSO were compared with several simulation experiments. The simulation results show that the DE-based FOPID controller tuning approach provides improved performance for the setpoint tracking, error minimization, and measurement noise attenuation