ASSIGNMENT – 1

1. Given $\frac{dy}{dx}=\frac{1}{x^2+y}$, $y(4)$ = 4, find $y(4.2)$ by Taylor's series method of order 2, taking h=0.1.

2. Solve $\frac{dy}{dx}=3x+y^2$, y(0) = 1 in the interval [0, 0.4] by taking h=0.2 using the 3rd orderTaylor's series method.

3. Solve the differential equation $\frac{dy}{dx}=2y+3e^x$ with $x_0=0, y_0=0,$ using Taylor's series method of order 2 to obtain the value of y *at* x = 0.1, 0.2.

4. Given $\frac{dy}{dx}=y-x$,where $y(0)$ = 2, find $y(0.1)$ and $y(0.2)$ by Euler's method up to two decimal places.

5. Solve $y'=x-y^2$, y(0) = 1 using the forward Euler method for in [0, 0.6] by taking h = 0.2.

6. Given that $\frac{dy}{dx}=x+y^2$, $y(0)$=1, find $y(0.2)$, using the backward Euler's method.

7. Given $\frac{dy}{dx}=-\frac{y-x}{1+x}$, with initial condition $y(0)$ = 1, find approximately y for x = 0.1, by backward Euler's method in two steps.

8. Use modified Euler's method with one step to find the value of y at x = 0.1 to five significant figures, where $\frac{dy}{dx}=x^2+y$, y=0.94, when x = 0.

9. Using modified Euler's method, solve numerically the equation $\frac{dy}{dx}=x+|\sqrt{y}|$ with the initial condition y = 1 at x = 0 in the interval [0, 0.6] in steps of 0.2.

10. Use Runge-Kutta method of order 2 to solve $y'=xy$, y(1) = 1, in [1, 1.4] by taking step-length h = 0.2.

11. Solve the differential equation $\frac{dy}{dx}=\frac{1}{x+y}$, y(0) = 1, in [0, 2] using the fourth-order Runge-Kutta method, step length h = 0.5.

12. Use fourth-order Runge-Kutta method to solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$, 0.1, with y(0)=1, find y at x = 0.2, 0.4.

13. Using fourth-order Implicit Runge-Kutta method compute y(0.2), y(0.4) from $\frac{dy}{dx}=x^2+y^2$, y(0)=1, taking h=0.2.