CBNST Assignment No. 4

(Based on Unit - 4)

Q1. Find y(0.2) if $\frac{dy}{dx} = \log(x + y)$; y(0) = 1. Use Picard's method.

Q2. Employ Picard's method to obtain the solution of $\frac{dy}{dx} = x^2 + y^2$ for x = 0.1 correct to four decimal places, given that y = 0 when x = 0.

Q3. Employ Picard's method to find y (0.2) and y (0.4) given that $\frac{dy}{dx} = 1 + y^2$ and y (0) = 0.

Q4. Given that $\frac{dy}{dx} = log10(x + y)$ with the initial condition that y = 1 when x = 0. Find y for x = 0.2 and x = 0.5 using Euler's modified formula.

Q5. Given $\frac{dy}{dx} = x^2 + y$, y(0) = 1, find y(.02), y(.04) and y(.06) using Euler's modified method.

Q6. Solve for y at x = 1.05 by Euler's method, the differential equation $\frac{\mathrm{dy}}{\mathrm{dx}} = 2 - \left(\frac{\mathrm{y}}{\mathrm{x}}\right)$ where y = 2 when x = 1. (Take h = 0.05).

Q7. Use Euler's modified method to compute y for x = .05 and .10. Given that $\frac{dy}{dx} = x + y$ with the initial condition x0 = 0, y0 = 1. Give the correct result up to 4 decimal places.

Q8. Find y(2.2) using modified Euler's method for

$\frac{dy}{dx} = -xy^2; y(2) = 1$. Take h = .1 .

Q9. Solve by Taylor's method: $y' = y - \frac{2x}{y}$; y(0) = 1. Also compute y(0.1).

Q10. Given the differential equation $\frac{dy}{dx} = \frac{1}{x^2+y}$ with y(4) = 4. Obtain y (4.1) and y(4.2) by Taylor's series method.

Q11. Use Runge-Kutta Method to find y when x = 1.2 in steps of 0.1 given that

$\frac{dy}{dx} = x2 + y2$ and y(1) = 1.5 .

Q12. Given $y' = x^2 - y$, y (0) = 1 find y(0.1), y(0.2) using Runge-Kutta Methods of (i) Second Order (ii) Fourth Order.

Q13. Using Runge-Kutta Method of Fourth Order, solve for y(0.1), y(0.2) and y(0.3), given that $y' = xy + y^2$, y(0) = 1.

Q14. Given $\frac{dy}{dx} = xy$ with y(1) = 5. Using the Fourth Order Runge-Kutta Method, find the solution in the interval (1, 1.5) using step size h = 0.1.

Q15. Apply Milne's Method to solve the differential equation $\frac{dy}{dx} = -xy^2$ at x = 0.8, given that y(0) = 2, y(0.2) = 1.923, y(0.4) = 1.724, y(0.6) = 1.471

Q16. Given $\frac{dy}{dx} = \frac{1}{2}(1 + x^2)\, y^2$ and y(0) = 1, y(0.1) = 1.06, y(0.2) = 1.12, y(0.3) = 1.21, evaluate y(0.4) by Milne's Predictor-Corrector Method.

Q17. Given $\frac{dy}{dx} = -xy$ with y(0) = 1. Solve the equation in the interval (0, 1) using step size = 0.5 using Predictor-Corrector Method. Give algorithm of Predictor-Corrector Method.