





Coimbatore – 35

#### DEPARTMENT OF MATHEMATICS

UNIT - Y NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

MILNE'S PREDICTOR AND CORRECTOR METHODS FORMULAS:  $y_{n+1}, P = y_{n-3} + \frac{\varphi h}{3} [2y'_{n-2} - y'_{n-1} + 2y'_n] \rightarrow Milne's predictor dormular$ yn+1, C = yn+ + th [yn+ 4yn+ yn+1] → Milnes Conector gormular Solve y'= x-y2, 0< x ≤ 1, y(0)=0, y(0.2)=0.02, y(0.4)=0.0795 y(0.6)= 0.1762 by Milne's method to find y(0.8) and y(1).  $\frac{\text{Soln:}}{\text{Gin:}} \mathcal{G}_{\text{in:}} \mathcal{H}_{0} = 0 \quad \rightarrow \quad \mathcal{Y}_{0} = 0$ A STAN STAND  $\chi_1 = 0.2 \Rightarrow \chi_1 = 0.02$ x2 = 0.4 → y2 = 0.0795  $x_3 = 0.6 \rightarrow y_3 = 0.1762$  $\chi_{y=0.8} \rightarrow -y_{y=2}$  $\chi_{s=1} \rightarrow y_{s=2}$ 012410 Here h=0.2.

23MAT204–STATISTICS & NUMERICAL METHODS S.SINDHUJA/AP/MATHS/SNSCT PAGE - 1 OF 4







Coimbatore – 35

#### DEPARTMENT OF MATHEMATICS UNIT -V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

WET Milne's predictor formula is Yn+1, P= Yn-3 + 4 h [2y'n-2 - y'n-1 + 2yn'] Y4, p = yot 4th [24,'-42'+243'] Gn: y'=x-y2  $y_{1}^{1} = \varkappa_{1} - y_{1}^{2} = 0.2 - (0.02)^{2} = 0.1996$  $y_{2}^{1} = \varkappa_{2} - y_{2}^{2} = 0.4 - (0.0795)^{2} = 0.3937$  $y_3' = x_3 - y_3^2 = 0.6 - (0.1762)^2 = 0.5690$  $y_{4,p} = 0 + 4(0.2) \left[ 2 \times 0.1996 - 0.3937 + 2 \times 0.5690 \right]$ = 0.3049  $y_4' = x_4 - y_4^2 = 0.8 - (0.3049)^2 = 0.707$ 







Coimbatore - 35

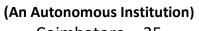
#### **DEPARTMENT OF MATHEMATICS**

UNIT -V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

$$\begin{aligned} & y_{4,c} = y_{2,t} + \frac{h}{3} \left[ y_{2}' + y_{3}' + y_{4}' \right] \\ &= 0.0795 + \frac{0.2}{3} \left[ 0.3737 + 4.05590 + 0.707 \right] \\ &= 0.3046 \\ \therefore \text{ Corrected value } g y \text{ at } x = 0.8 \& 0.3046 \\ \therefore \text{ Corrected value } g y \text{ at } x = 0.8 \& 0.3046 \\ \therefore \text{ for g} \text{ ind } y(i) \\ y_{5,p} &= y_{1,t} + \frac{h}{3} \left[ 2y_{2}' - y_{3}' + 2y_{4}' \right] \\ &= 0.02 + 4 \times \frac{0.2}{3} \left[ 2 \times 0.3937 - 0.5690 + 2 \times 0.707 \right] \\ &= 0.4853 \\ y_{5}' &= x_{5} - y_{5}^{2} = 1 - (0.4853)^{2} = 0.7327 \\ y_{5,c} &= y_{3} + \frac{h}{3} \left[ y_{3}' + 4y_{4}' + y_{5}' \right] \\ &= 0.162 + \frac{0.2}{3} \left[ 0.569 + 4 \times 707 + 0.7327 \right] \\ &= 0.4515 \\ \therefore \text{ Corrected value } g y \text{ at } x = 1 \& 0.4515 \end{aligned}$$

23MAT204–STATISTICS & NUMERICAL METHODS S.SINDHUJA/AP/MATHS/SNSCT PAGE - 3 OF 4







Coimbatore – 35

### **DEPARTMENT OF MATHEMATICS**

UNIT -V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

() using Milne's method find 
$$y(4.4)$$
 gn.  $5ny' + y^2 - 2 = 0$   
yiven  $y(4) = 1$ ,  $y(4.1) = 1.0049$ ,  $y(4.2) = 1.0097$  and i  
 $y(4.3) = 1.0143$ .  
Koln:  $y_{4,p} = 1.01897$ ;  $y_{4,c} = 1.01874$   
(2) using Runge Kutta method calculate  $y(0.1)$ ,  $y(0.2)$  and  
 $y(0.3)$  gn that  $\frac{dy}{d\pi} - \frac{2\pi y}{1+\pi^2} = 1$ ,  $y(0) = 0$ . Taking these  
values as starting values find  $y(0.4)$  by Milne's method  
 $\frac{goln!}{y(0.2)} = 0.2052$   
 $y(0.3) = 0.3176$   
 $y(0.4) = 0.4413$ 

23MAT204–STATISTICS & NUMERICAL METHODS S.SINDHUJA/AP/MATHS/SNSCT PAGE - 4 OF 4