

(An Autonomous Institution)



Coimbatore– 35

### **DEPARTMENT OF MATHEMATICS**

UNIT-VNUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

MILNE'S PREDICTOR AND CORRECTOR METHODS FORMULAS:  $y_{n+1}, P = y_{n-3} + \frac{6h}{3} [2y'_{n-2} - y'_{n-1} + 2y'_n] \rightarrow Milne's predictor dormular$ 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).  $\frac{\text{Soln:}}{\text{Gin:}} \mathcal{G}_{\text{in:}} \mathcal{H}_{0} = 0 \quad \rightarrow \mathcal{Y}_{0} = 0$  $\lambda_1 = 0.2 \Rightarrow y_1 = 0.02$ x2 = 0.4 → y2 = 0.0795  $\chi_3 = 0.6 \rightarrow y_3 = 0.1762$  $\chi_{y} = 0.8 \rightarrow -y_{\psi} = ?$  $\chi_{s} = 1 \rightarrow y_{s} = ?$ Here h=0.2. The start of provider habitudes .







Coimbatore-35

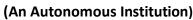
## **DEPARTMENT OF MATHEMATICS**

UNIT-VNUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Whit Milne's predictor formula is  

$$y_{n+1}$$
,  $P = y_{n-3} + \frac{1}{3} \frac{h}{3} [2y'_{n-2} - y'_{n-1} + 2y'_{n}]$   
 $y_{4}$ ,  $p = y_{0} + \frac{h}{3} [2y'_{1} - y_{2} + 2y'_{3}]$   
 $G_{1}^{n}$ ,  $y'_{1} = x - y^{2}$   
 $y'_{1} = x_{1} - y_{1}^{2} = 0.2 - (0.02)^{2} = 0.1996$   
 $y_{2}^{1} = x_{2} - y_{2}^{2} = 0.4 - (0.0795)^{2} = 0.3937$   
 $y'_{3} = x_{3} - y_{3}^{2} = 0.6 - (0.1762)^{2} = 0.5690$   
 $y_{4}$ ,  $p = 0 + \frac{1}{4} (0.2) [2 \times 0.1996 - 0.3937 + 2 \times 0.5690]$   
 $= 0.3049$   
 $y'_{4} = x_{4} - y_{4}^{2} = 0.8 - (0.3049)^{2} = 0.707$ .







Coimbatore-35

### DEPARTMENT OF MATHEMATICS

**UNIT-VNUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS** 

Y4, c = 42+ \$ Ty2+443+ 44] Can some on ? = 0.0795 + 0.2 [0.3937 + 4 x0 5690 + 0.707] The second second = 0.3046 : Corrected value of y at x= 0.8 is 0.3046. To find y(1): is the fill y5,p = y1+4h [242-43+244] = 0.02+ 4× 0.2 [2× 0.3937-0.5690+2×0.707) -0.4553  $y_5' = x_5 - y_5^2 = 1 - (0.4553)^2 = 0.7327$  $y_{5,C} = y_{3} + \frac{h}{3} [y_{3}' + 4y_{4}' + y_{5}']$  $= 0.1762 + \frac{0.2}{3} \left[ 0.569 + 4 \times 707 + 0.7327 \right]$ = 0.4515 : corrected value of y at n=1 is 0.4575.





(An Autonomous Institution)

Coimbatore- 35

### **DEPARTMENT OF MATHEMATICS**

UNIT-VNUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

() wing 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  
 $y(4.3) = 1.0143$ .  
Koln:  $y_{4,p} = 1.01897$ ;  $y_{4,c} = 1.01874$   
(2) wing Runge Kutta method calculate  $y(0.1)$ ,  $y(0.2)$  and  
 $y(0.3)$  gn that  $\frac{dy}{dn} - \frac{2ny}{1+n^2} = 1$ ,  $y(0) = 0$ . Taking there  
values as starting values find  $y(0.4)$  by Milne's method  
 $\frac{goln!}{y(0.2)} = 0.2052$   
 $y(0.2) = 0.3176$   
 $y(0.4) = 0.4413$